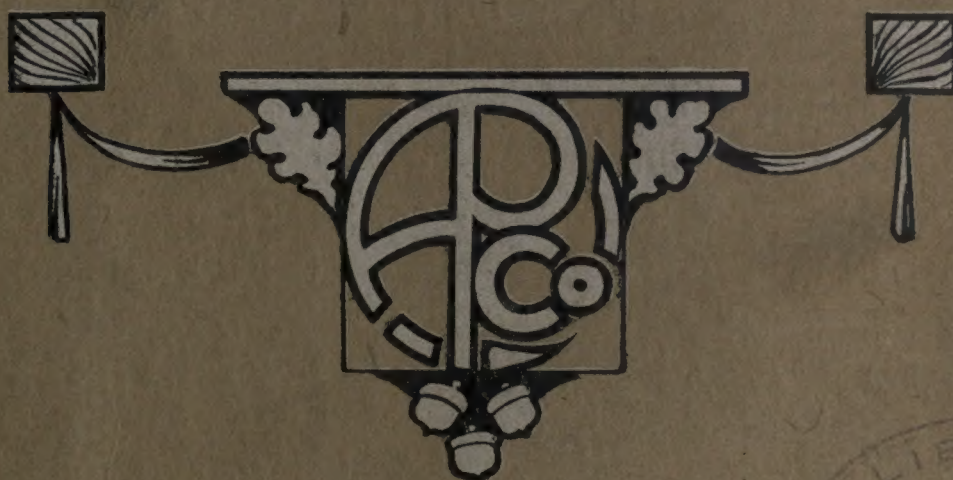


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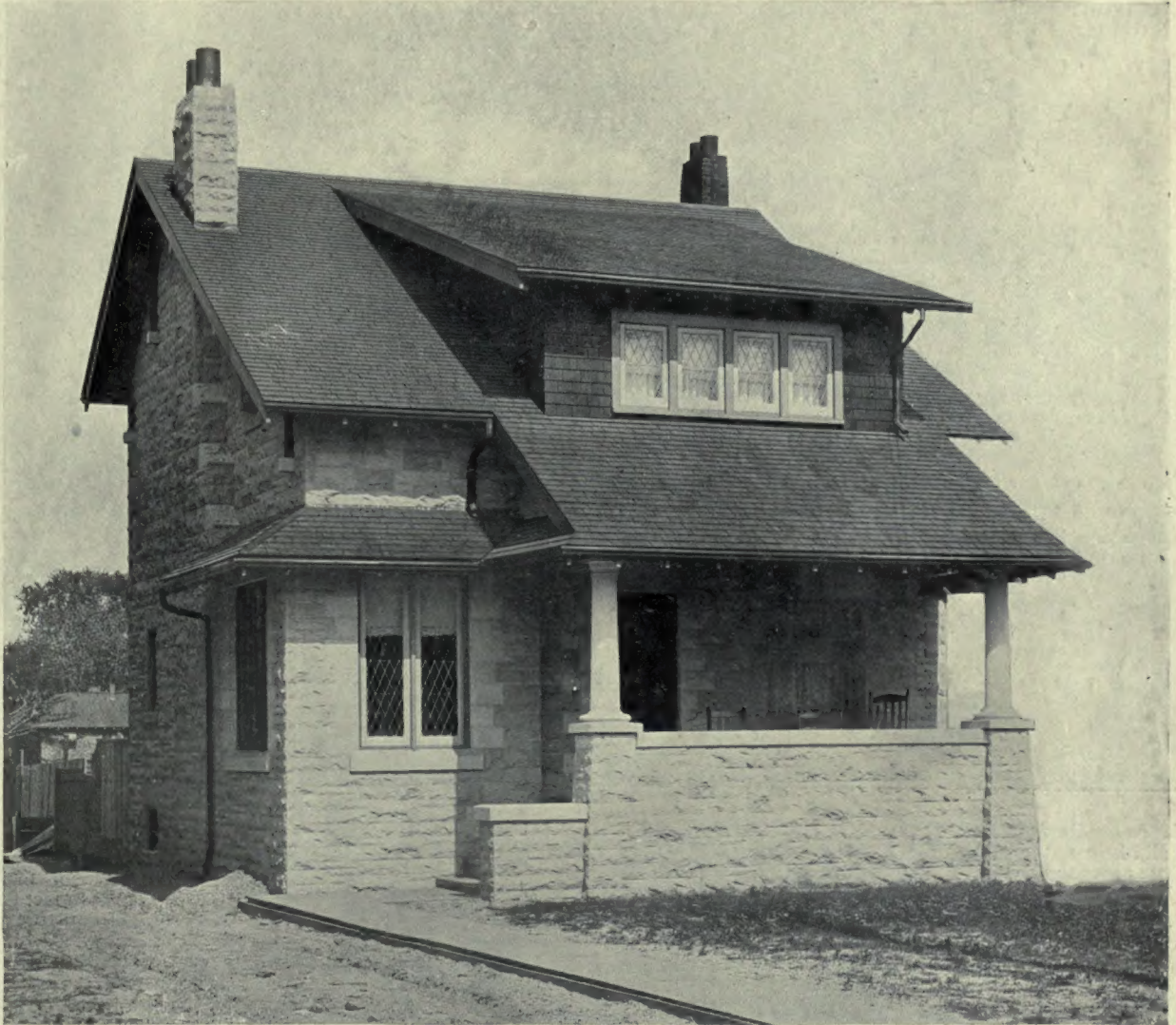
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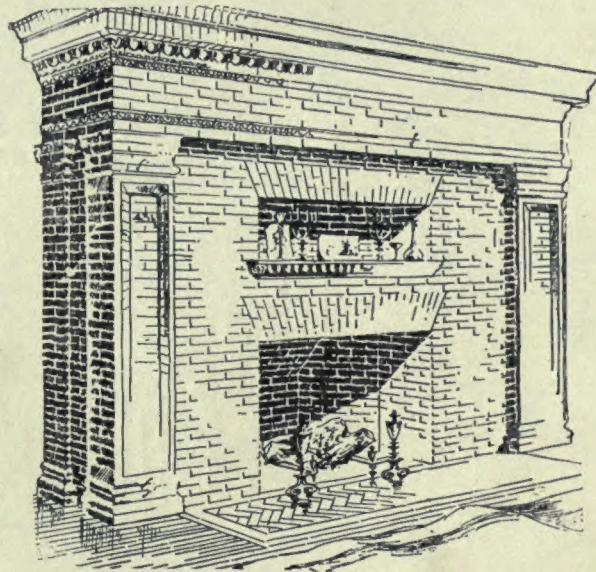


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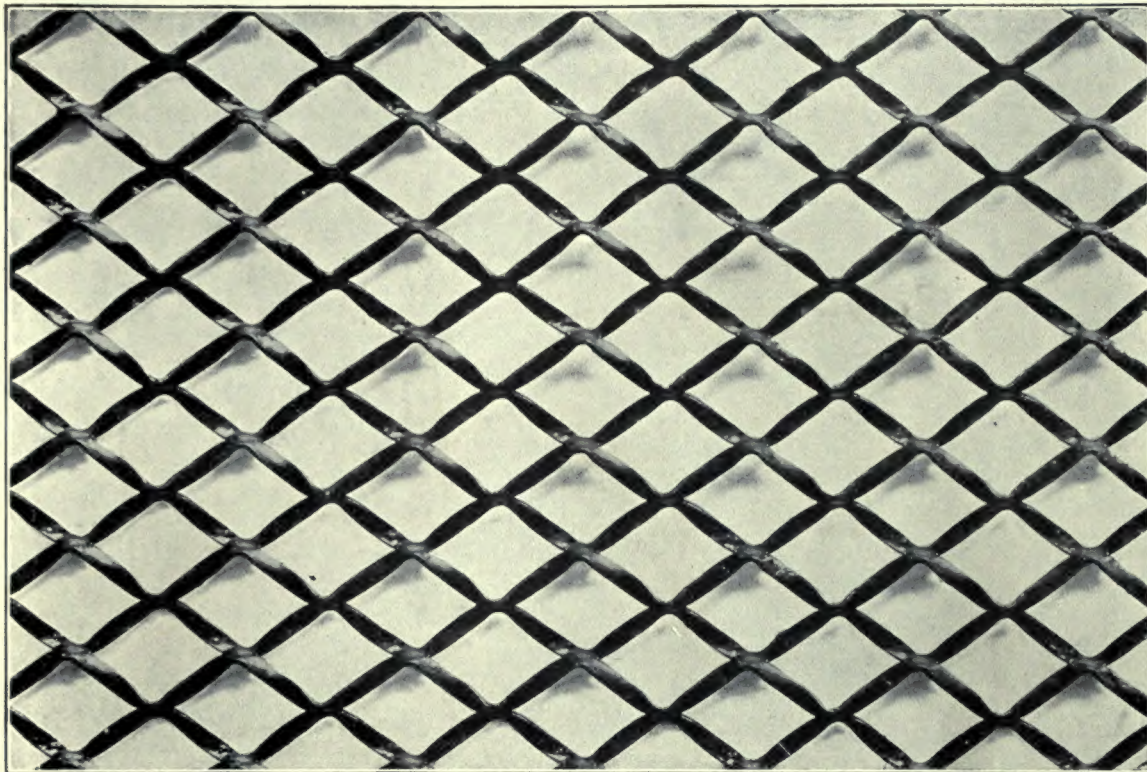
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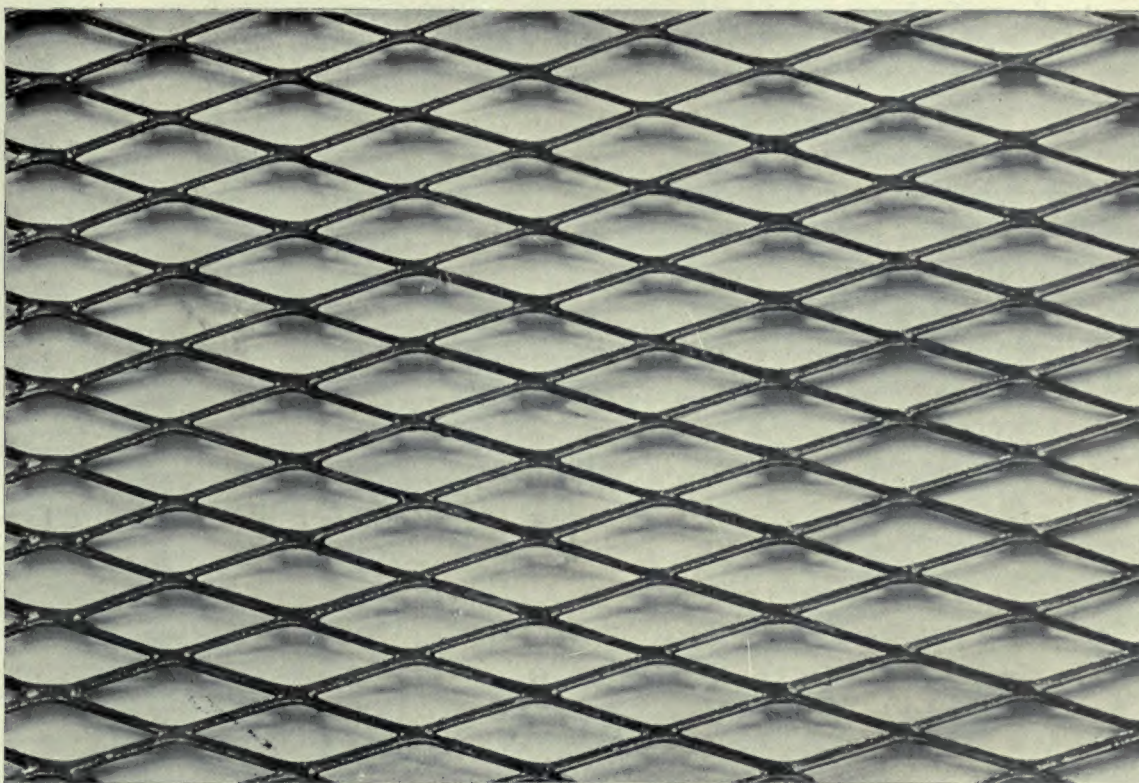
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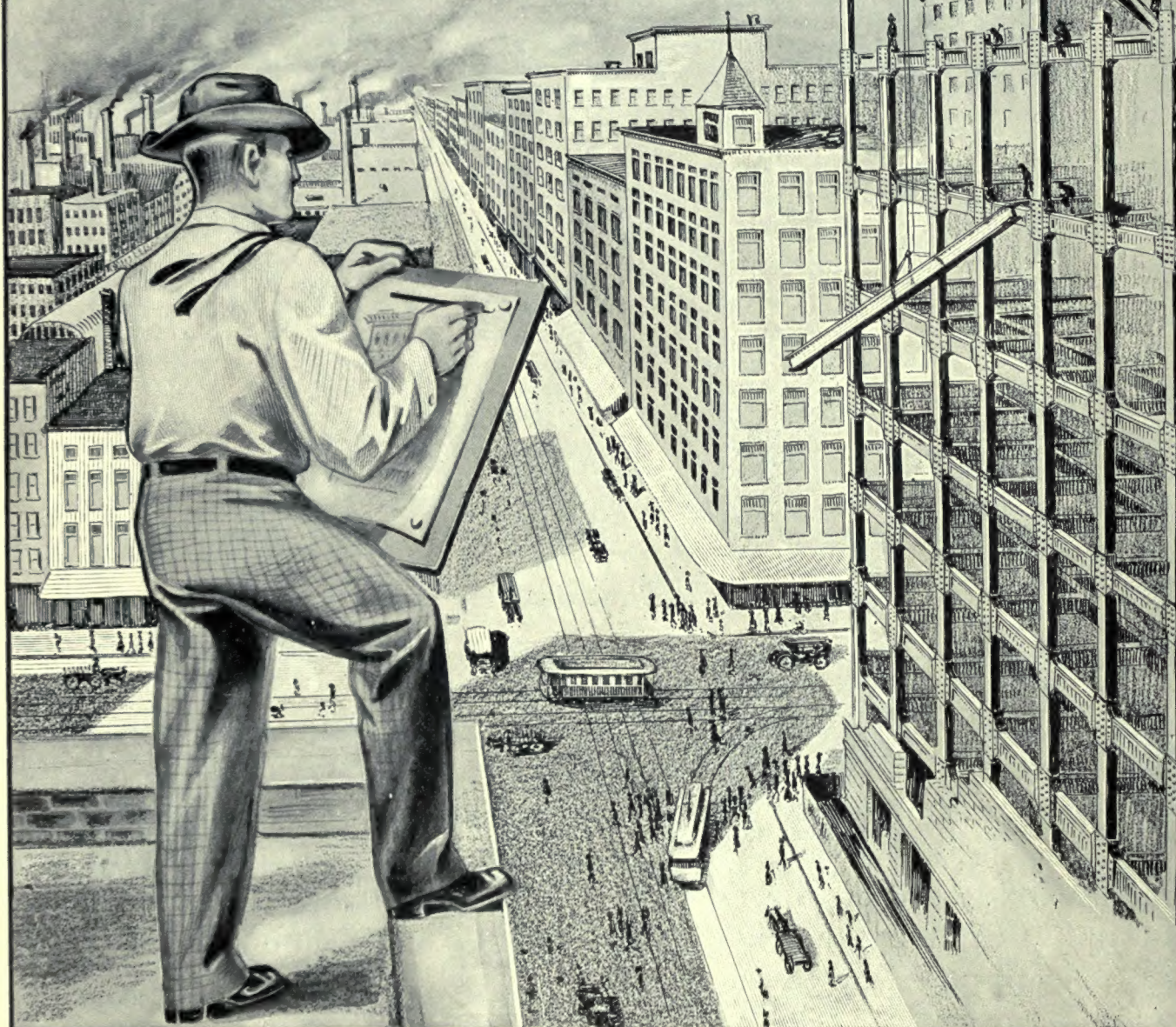
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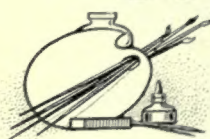
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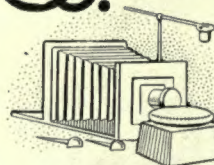
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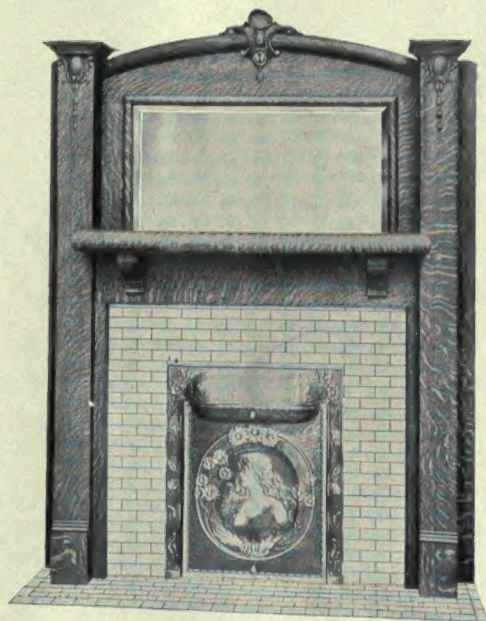


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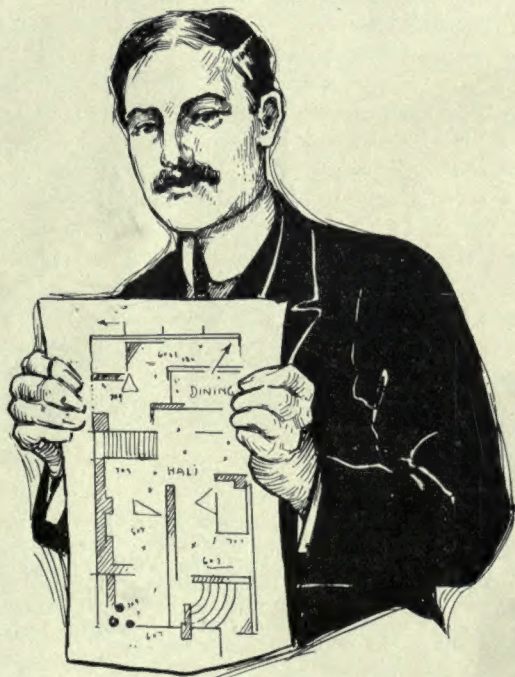
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C. H. MOODY

Moody has started out to call on the builders and contractors all through British Columbia. He is characterized by a deep Scotch voice that sounds strange coming from one so small.



F. J. TYNER

Tyner has been assigned to Manitoba and Saskatchewan. Merchants in these provinces will find him full of enthusiasm over The Builder and Contractor and the service it will give its readers.



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Talbot works in Eastern Ontario. He'll be thoroughly in earnest when he tells the merchants in his territory that they can't be happy without The Builder and Contractor.



H. KAVANAGH

You don't have to look twice to know he's Irish. Kavanagh spends most of his time in Quebec Province, but occasionally will go west as far as Kingston.



L. H. DRAKE

Drake is covering Western Ontario. You can tell at a glance that he is an optimist by nature, and he assures us he never felt more optimistic about anything than he does over The Builder and Contractor.



F. PANG

Pang looks serious, and so he is. He believes publishing a trade paper is a serious business. At that rate he won't find it difficult to maintain his enthusiasm over The Builder and Contractor and he will try to impart some of it to the trade in the Maritime Provinces.

In addition to Messrs Moody and Tyner, J. W. Miller has also been assigned to the Western Provinces.

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THE BUILDER AND CONTRACTOR

Vol. 1, No. 6.

Toronto, July 15, 1911.

\$1.50 Per Year.

ACTON PUBLISHING CO.
LIMITED

OFFICE OF PUBLICATION
59-61 JOHN STREET - TORONTO
Eastern Office, Coristine Building, Montreal
Chicago Office, 4075 Perry St., Chicago, Ill.

A Journal Devoted to the Interests of the
BUILDERS OF HOMES

PUBLISHED ON 15th OF EACH MONTH

For Contents See Page 277

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K. A. MACKENZIE, B.A.Sc., MAN. EDITOR

Even the most casual observer must be impressed with the wide diversity of figures in tenders on many important jobs. The differences cannot be accounted for entirely by the saving in materials or a difference in labor efficiency. The divergency is generally in the estimating, and there is great room for improvement along this line. There is a strongly marked movement in this country at the present time in every line of activity towards greater efficiency. Great opportunity for improvement is necessary for the building trades along the lines of scientific methods in estimating.

Estimating and Taking of Quantities

The present methods are familiar to most builders. An architect designs an important building, the owner approves the plans and bids are called for. While there has been all sorts of delay up to this stage, haste is the one great cry, and frequently not more than ten days is allowed for the submission of bids. The builder gets the plans and specifications, and sets his estimators to work, drawing off quantities and pricing them. If the award is to go to a general contractor in one bid he has to submit the plans and specifications to at least a dozen sub-contractors in the various lines.

These go through the same process in turn and their bids have to be revised and approved before the final bid is submitted to the architect and owner.

Let us suppose as an extreme case, say, the building is a large and costly one and that bids are requested from ten general contractors. Each of these might, in turn, ask bids from ten different sub-contractors, so we would have one hundred men, taking off quantities and pricing them.

The time allowed for all this work is ridiculously short, and it is not to be wondered at that in the bids received there is a diversity of cost ranging over twenty per cent., owing to mistakes either in the quantities or prices. These mistakes are not the rule, of course, nor do they always entail severe penalties, because the architect may be lenient, or the very lowness of the bid prevent acceptance. Numerous examples of this might be cited. The question arises, what can be done

to prevent such chances of error and at the same time be fair to contractor, architect and owner?

Anyone familiar with building operations in Great Britain is impressed with slight variations in tenders for buildings. The range from highest to lowest is rarely more than five per cent. In this country such a coincidence on a season's work would give rise to a suspicion of a "frame up" among the contractors.

The reason, however, is owing to a difference in method in the old world. In Great Britain after the architect's plans have been approved by the owner, they are not sent out with the specifications to the builders and contractors. They are sent first to the quantity surveyor. The quantity surveyor is a profession practically unknown in Canada. He is a man who has a careful and thorough training in building operations and who is enabled to establish himself only because he is dependable and accurate. He takes off an itemized bill of quantities, including everything that enters into the construction of the building. This bill of quantities is returned to the architect and copies are sent to the builders with the plans and specifications for estimating. The details make estimating easy and rapid. When it is returned to the owner and architect it has the advantage of being an itemized bid. If, after the contract is awarded, it is decided to cut out some of the work, it does not open up a fruitful source of trouble as in this country. There is no room for dispute as the price of the items eliminated shows in the bill of quantities and may be deducted from the total bid. It forms a ready basis for reckoning extras.

Much can be said for and against this method of procedure. The quantity surveyor may make a mistake. This risk, however, is reduced to a minimum.

In the first place his training is long and painstaking. His reputation is at stake on every job, and his business can only be built up on proof of accurate work. In the second place the builder on being awarded the contract is allowed some time in which to satisfy himself that the quantities are correct, after which they have to be accepted and carried out according to the specifications. It is not a long or diffi-

cult matter to check up a bill of quantities with sufficient thoroughness to ensure one of its accuracy.

The usual practice here of the architect after he has planned a building is to "cube" it in order to arrive at a rough estimate of its cost. The careful contractor, however will use the cube method merely as a check on his quantities.

The question naturally arises, why cannot the architect supply the quantities? In Great Britain, according to the code of ethics, no architect who is a member of any of the leading societies can serve as a quantity surveyor. In America, with the tendency of architecture towards a closed profession the rule also holds. The quantity surveyor works generally on a percentage basis, for small work usually two and a half per cent., decreasing with the magnitude of the work.

The principal objection from the point of the builder is that gives away too much information to his competitors along the line of unit costs. The owners on the other hand object to the extra two per cent. This point should be remembered, however,—all work must be eventually paid for. If the contractor takes off the quantities he must add an office percentage, covering not only the particular job, but also the expense figuring on those he failed to close. So if every contractor takes off full quantities ten times as many men must be paid for the work. Again, if the work is taken off hurriedly a percent- age must be added to provide for contingencies. Eventually the owner must pay.

There have been several attempts made to establish the profession in Canada, but owing to the lack of encouragement, and the phenomenal prosperity of the country, the men have gravitated into the more profitable field of contracting. Our technical schools are now developing men capable of performing the work and probably the near future will produce results.

In our last issue there appeared a short article on "Efficiency in Brick Work," referring particularly to the recent application of motion study to the laying of brick. It showed by the application of scientific principles to laying

Does Scientific Management Degrade the Workman

of brick that the number of motions could be cut down from eighteen to six, and that it was necessary in order to produce most efficient results that the workman should be required to conform to these motions. We had a most interesting discussion on this point with several builders at the Builders Exchange. They all admitted that there was considerable loss of time and energy under ordinary circumstances, but claimed that the enforcement of these new fangled ideas, usually introduced by outsiders, would destroy all initiative in workmen and make them mere machines, reducing them to practical slavery.

It must be admitted that these improvements are usually introduced by outsiders who "know nothing about the business," but the notable thing is that they usually produce good results. It must be further admitted that mistakes have been made, but the gains so far outweigh the losses that they can be well overlooked.

The point that scientific management tends to impair the initiative of the workman and reduce him to a mere machine has been raised so often that Chas. Thurston Kent, one of the ablest writers on the subject, has replied to it. Mr. Kent's activities have been mostly along the lines of machine shop work, but the underlying principles are the same throughout all industry. These articles will have secured their purpose if they simply cause the employer and employee to

observe closely and ask themselves the question, "Is this method I am employing the one most suited to obtain the best results." In time they will be able to answer most of the questions.

"What does scientific management do for the workman? Does it destroy his initiative? Does it make of him a mere machine, blindly following instructions? Does it unfit him for everything but the one job which he has been taught to do? Or, on the contrary, does it make of him a better workman and a better citizen? These are pertinent questions for the owner of a factory or of a business to ask. We have heard much of late years about the disappearance of the good old-fashioned all-around mechanic who could turn his hand to anything mechanical. The old apprenticeship system has been destroyed, and if we are to have machinists we must develop something to take its place.

"Scientific management, we claim, has done this, and so far from making men into machines, destroying their intelligence, and unfitting them for any but one particular job, makes of them far better workmen than the old apprenticeship system ever tried to or could do. This is not argument. It is fact, and we shall presently cite some instances to prove our case. Meanwhile, let us see why scientific management can do these things.

"In the early days, the apprentice was taught by one or several workmen, as much or as little of his trade as the men thought was necessary or proper for him to learn. These men were, we will assume, the best mechanics of their day, but as has been shown time and again, they were not the best mechanics that it was possible to develop. The principles of time study and motion study had not been applied to them, and nobody will today dispute the value of these two principles alone, in increasing the ability of the workman. The application of these studies to the methods of the old-line workman discovered so many better ways of doing work that it gave rise to the saying "The way we have always done it is probably wrong." Manifestly then, the apprentice who was instructed by a workman skilled in wrong methods of doing work, was not being made into the best possible mechanic.

"Now let us see how scientific management proceeds with the same task. In the first place, it assumes that any workman, no matter how good he is, is capable of receiving instruction from a man who knows more about the work than he does himself. Consequently it provides one or more experts usually called "gang bosses," each a specialist in his particular line, who is at the service of every workman and who is *required* to instruct them in the best methods of doing work. Every man in the shop from the youngest apprentice to the highest-priced workman is benefited by the presence of these experts. In the second place, every job of work is subjected in advance to an analytical study of the methods to be followed in doing it. The process is the same as the analysis followed in the design of a piece of machinery and it reveals the best method based on study, experience and experiments. The workman or apprentice is instructed in these methods by the experts and is not left to his own devices until he has mastered the instructions. Consequently, the apprentice is made into a better workman than formerly because he is instructed by an expert and is also instructed in the right way of doing his work.

"An apprentice or a workman trained in this fashion soon acquires an aptitude for absorbing information, which enables him to become a good all-around workman in a comparatively short time, even though his previous work has been at one job of a more or less repetitive character. As an in-

stance, we may cite the case of a workman in a scientifically managed shop who for two years or more was running a turret lathe. He had no previous training, having been a laborer when he took the job at the turret lathe. He acquired great facility in handling this particular machine when instructed in accordance with the above ideas. It was decided to retain him to run other machines, and he was taken off the turret lathe and placed at one machine after another throughout the shop. In six months this man became the best all-around machinist in the place. While there may have been some natural ability on the part of the man, it would have been inconceivable in the old days that a thorough machinist could be made in such a short period of as this.

"Another instance. In a certain textile mill, a man had been a laborer in the shipping room for a period of five years. Scientific management was introduced, and under the instruction given, this particular man developed capabilities that soon made him foreman of the room, later on head of a department, until finally, within four years of the time when he was a laborer he is superintendent of the entire plant, employing nearly 1000 hands, and furthermore he is the best superintendent the mill ever had.

"In the face of examples like these, can any one say that scientific management blunts the workman's intelligence? Workmen under scientific management undoubtedly make better citizens than those who are not under it. It is undeniable that a man who is able to raise his standard of living is more contented than he would be otherwise, and contented men are undoubtedly of greater value to the country than those who are not. It is also undeniable that a man who increases the output of manufactured products is adding to the wealth of the country, and if he does this without detriment to himself he is undoubtedly a better citizen. Scientific management, by taking a man who by his own efforts would never emerge from the laborer class, and making of him a skilled man, has undoubtedly conferred on that man, and on the community, untold benefits. It is a mistake to suppose that the tendency of scientific management is to blunt the intelligence of the workman. On the contrary, one of its principal aims is to help him and to improve his condition.

Speaking for the independent manufacturers of cement, Mr. W. P. Telford, of Owen Sound, puts up a strong argument in reply to the general attack in the Western press on the cement merger and incidentally on all other makers of cement. Mr. Telford has a thorough knowledge of the business and is a man of the highest integrity. When he states that the company with which he is connected and other independent companies can make little or no profit on cement at a net wholesale price of \$1.20 per barrel his word will not be doubted.

He bids those who protest against the high retail price of cement look elsewhere for an explanation of their grievance. It costs \$48 to carry thirty tons of cement by rail from Owen Sound to Toronto, while thirty tons of stone are carried between the same points for \$18. Cement, which costs \$1.20 per barrel, wholesale at Owen Sound, costs the consumer \$3.08 at Edmonton. Mr. Telford says that gives the company hauling it there \$1.88 per barrel for doing so. Cement is a very heavy commodity, and it is quite possible that the company which carries a barrel of it over the lakes and the plains to Edmonton actually performs a service relatively as much worth \$1.88 as the producing company's service is worth \$1.20. But this does not seem a fair division

of the ultimate cost, and when the operations of the cement merger are inquired into by the authority of Parliament, as they must be to satisfy public opinion, the independent producers should put their grievances against the transportation companies fully before the country. Mr. Telford may rest assured that neither the people nor the press wish to crush legitimate industries.

During the various discussions on the need of more liberal building laws, especially in reference to reinforced concrete construction, numerous instances of failures have been cited. In some cases these failures have been very serious, entailing loss of life. The BUILDER AND CONTRACTOR is a believer that there is room for and a field for every material of construction, and that it is a short-sighted policy to attempt to force one material into every conceivable use.

We particularly enjoy reading our American contemporaries, "*Stone*" and "*Brick*." They keep us thoroughly in touch with the failures of concrete.

A thorough study of these failures shows that, where competent engineers or architects have been employed, that the trouble can practically always be laid at the door of faulty inspection.

No one can blame the Building Departments for being cautious, but they should attempt to place first things first, and not make design carry all the burden.

In all building, a double factor of safety is required, a factor of safety for the materials, and a factor of safety for labor. In the case of steel structures, experiment and experience have given us very definite information as to the material, and it is an easy matter to inspect the assembling, rivetting, etc., during the progress, or before the work is covered up, so a relatively low factor is required, especially in the case of inspection.

In concrete, the conditions are different. Experiment has given us very definite information as to the strength of both concrete and reinforced concrete, under favorable conditions, but so many opportunities arise for getting away from these on actual work, that the inspection factor must be considerably increased—bad cement, bad sand, bad stone, improper mixing, improper tamping, too rapid setting in hot weather, freezing in cold weather, too early removal of forms, are only some of the difficulties that must be avoided through proper inspection. The inspector is the most important man on the job. He must be a thoroughly trained and reliable man. In spite of this, there is a great laxity in his appointment.

The failure of the Henke Building in Cleveland, Ohio, which has been cited so often as a concrete "failure," illustrates what is too common practice. After the disaster, a competent commission was appointed to make a thorough investigation.

The commission has reported and its findings are of the greatest interest and value. Concrete construction was not on trial in this case, or if it was, it has been acquitted, for no facts developed by the investigation cast the slightest doubt upon the efficiency of reinforced concrete as a building material. With no attempt to palliate the circumstance, and with a comprehensive directness, the commission has laid the blame specifically where it belongs. The city building department, the architect, the owner, and the contractor are all indicated as contributing to the failure by acts of either commission or omission.

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Why Cement Is Dear

Summing up the primary causes of failure, the Report makes the following comment:

It is the belief of the commission that the architects were negligent in the following respects;—

1. Although the evidence shows that the architects advised and requested the owner to place a special reinforced concrete inspector on the work during the progress of construction, they did not specifically call the owner's attention to section 473 of the building code, which, by "mandatory requirements," provides that the owner shall place such an inspector on the work.

2. The architects did not name in the application for the building permit a special inspector, as required by section 473, who was to be continually on the work during the placing of concrete and steel.

3. The architects did not give adequate consideration to the removal of the forms of the concrete work. They evidently gave little attention to weather conditions from October 22 to November 22, inclusive, when, according to the United States weather reports, there were 16 days of which the temperature was at or below 35, on 9 of which the temperature was 32 or below with a minimum of 25; and during which time there were only 4 clear days with 15 days of rain or snow. Under these weather conditions more than ordinary precautions should have been taken in the removal of forms.

4. The architects did not give adequate consideration to the sand used in the building. The specification called for washed sand, while unwashed sand, not of uniform quality, was used.

5. The architects did not exercise proper judgment in advising the owner in regard to the rapidity with which the work could be safely prosecuted.

It is the opinion of your commission that the contractor upon signing the contract, assumed the responsibility of executing the work in accordance with the plans and specifications. The contractor was negligent in the following particulars:

1. The foremen employed on the building were ignorant of the requirements of the drawings and specifications; did not exercise proper care in the measurement and mixing of concrete aggregate and the placing of reinforcing steel; allowed brick work and erection of forms to proceed upon green concrete; and conducted the work generally in a loose, slipshod and hurried manner.

2. The reinforcing steel was carelessly placed in ribs, girders and columns, and "no provision was made to insure steel being in its proper position after concrete had been poured."

3. The structural members of concrete were not of proper sizes, concrete was of poor quality and not properly placed.

4. The sand used was, in many cases, of inferior quality, contained loam and clay and did not meet the specification requirements for washed sand.

5. The cement delivered at the building was apparently 20 per cent less in amount than the amount necessary to properly construct the work in accordance with the specifications.

6. The forms were usually removed without the consent of the architects in violation of the specification requirements.

In the east side of the third story, forms, supporting the fourth floor, were removed in 16 days after the pouring of concrete, and the floor re-shored. The removal of these forms, in this short time, was, considering the weather con-

ditions during the month of November, extremely dangerous. This time would hardly have been sufficient under favorable weather conditions.

These forms were removed without the consent of and contrary to the instructions of the architects.

It is the opinion of your commission that the removal or changing of these forms and shores was the one primary cause of the collapse.

In the opinion of your commission the owner was negligent in that he did not employ a special reinforced concrete inspector on the building as advised by the architects.

The report proceeds as follows:

The evidence shows that the inspector of buildings, engineer of construction and the masonry inspector in that district were at the building enough times to have ascertained whether such special inspector was on the work or not; to say nothing of the fact that daily reports were not being made to the inspector of buildings by such special inspector.

On the subject of concrete construction the commission says:

Your commission finds, from its investigation, no reason to condemn the use of concrete in combination with steel for the structural parts of buildings; provided, the concrete is composed of proper materials, accurately measured and thoroughly mixed; the steel of sufficient strength and properly placed; the work installed by competent contractors and workmen, and the specifications, drawings and construction prepared and executed under the direction of competent designers and inspectors.

The commission was composed of able and unbiased engineers and architects and the report merits study and consideration. The failure was one of workmanship and not of material.

In the eyes of many, there is a serious disadvantage in using concrete as a fire-proofing material, in that while its constituents are non-combustible, they are not fire-proof. Under high temperature the cement will dehydrate and crumble, while, if limestone is used every one is familiar with what is likely to happen. The difficulty is that limestone is generally the one used in Canada. Of course, it is very rarely that the temperature in a "fire-proof building" reaches such a height as to accomplish this. The difficulty is so obvious, however, that the National Cement Users Association through their Committee on Treatment of Cement Surfaces, have considered the question of fire-proofing concrete. An interesting solution has been advanced through the use of sodium silicate to mix with the concrete in two columns, girders or slabs, in order to make them impervious to any effect of excessive heat, in case of fire. A passage in their report gives the result of their experiments:—

If the concrete surface is first treated, it can then be enamelled. Take a piece of cured concrete, thoroughly dry, immerse for a few hours in a solution of 1 part 40 degrees Baume of sodium silicate, 3 parts water, remove from solution, allow to dry in a warm place for 24 hours, and again immerse in the same solution of sodium silicate, remove, and allow to dry in a warm place for 24 hours. It will be found that concrete so treated will stand without dehydration of the cement, a very much higher heat than untreated concrete.

This seems a rather impracticable method of treatment. The idea naturally arises, what would be the effect of mixing a percentage of sodium silicate with concrete to be used for structural purposes, so in case of fire instead of dehydration, the concrete would become enamelled? Sodium silicate is cheap and staple. The idea seems to present interesting possibilities, and to be worthy of experiment.

Attractive Cottage of Cement Stone

Cost Approximated \$3,500.00

Ordinarily, the bungalow cottages type is unsuitable for the narrow lot of the crowded city streets. The type almost essentially requires them to be situated on spacious grounds. Their popularity in the suburbs, however, has developed the story and a half cottage, combining some of the advantages of both the urban and suburban home.

Some months ago we presented to our readers several examples of cottages of the bungalow type. Each was built of a different structural material; namely, frame, stucco, brick and stone. The one shown herewith is of cement stone.

The design of the small house deserves more thought and attention than it usually gets. The contraction of a larger

against the dead uniformity of the city block, and any attempt at individuality on the part of the builder is amply rewarded.

The modern fire-laws in this country have practically eliminated frame construction, so we have been living lately in what might be termed the brick age; due as has been pointed out to the fire restrictions, and also to the fact that brick has been the only incombustible building material



Attractive Broken Ashlar Cottage.

plan will not produce satisfactory results. Space is so limited that every thing must be planned for the most economical use of all available areas.

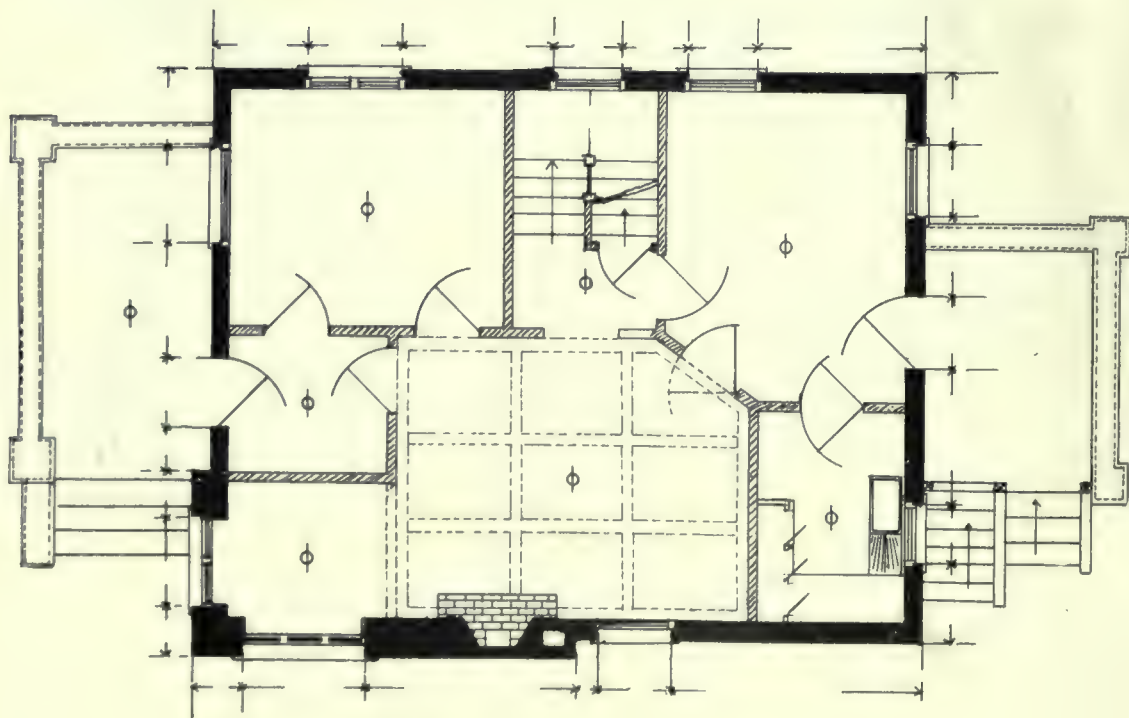
The average person, looking around to purchase a home, desires something a little different from his neighbor, and better, if he can afford it. The buying public have rebelled

suitable economically and practically to conform to these, building bylaws.

For many years, concrete in all its forms has in many instances began to take the place of brick and stone in a great number of our larger buildings, such as factories, etc., where only strength and durability have been considered



Side Elevation.



Floor Plan.—Ground Floor.

at the expense of appearance. Of late years, however, it has entered the field of house construction to a greater or less degree.

In a former issue we dealt most fully with the stucco finish. In this issue we present to our readers a cement stone house of an attractive design.

For artistic homes, concrete, by many, has not been considered suitable, either in the monolithic or block form.

The early stages of the concrete block industry is a striking example of the unwisdom of pushing a thing beyond its proper limits. We have today scattered throughout the country many buildings, whose dead, pressed in, monotonous, box-like appearance are standing advertisements, hindering the advancement of the concrete block industry.

Stone. This has been used with excellent results, on church and commercial buildings.

It is a great advancement on the ordinary concrete block. The process used to manufacture broken ashlar is one by which the monotonous appearance which is the distinguishing mark of ordinary concrete blocks is entirely eliminated. The stone is made in such a manner that the texture and shadows in the face visible to the eye, closely resembles pitched sand stone, and with the varying sized faces used, a wall laid up in broken ashlar has all the symmetrical and pleasing appearance of the natural stone. There are no blind or false joints, each and every stone is laid on its own bed. If brick backing is used, the stone can be made to the brick unit, i.e., one, two, three or four bricks in height,



View of Living Room, Showing Beamed Ceiling and Mantel.

Concrete stone, like everything else, had to go through its stages of development. Mistakes and crudeness in the early stages were to be expected. Today it is possible to produce an artificial stone equal to most and superior to many of the natural building stones, at a considerable reduction of cost.

This material in the hands of specialists is rapidly displacing the more expensive products of the quarry in our public and commercial buildings, with most satisfactory results.

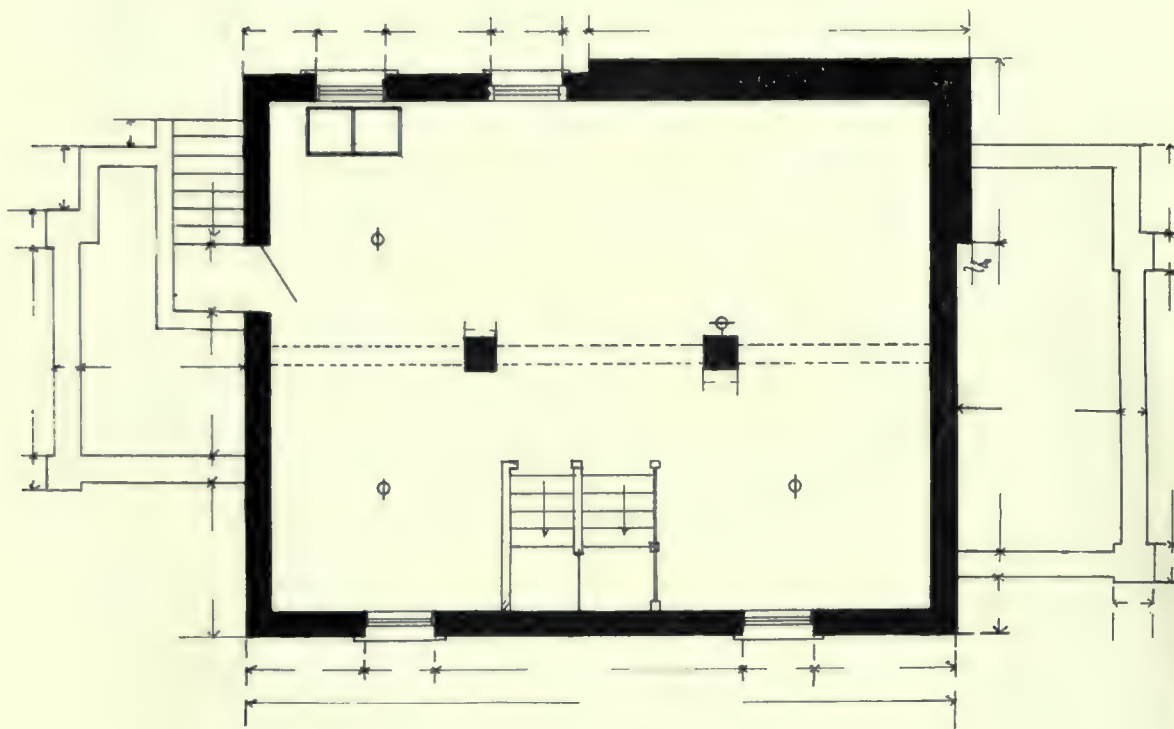
The same care and selection of materials will have similar results in residence construction.

One of the best examples of this advancement in concrete manipulation has been discovered in Broken Ashlar Concrete

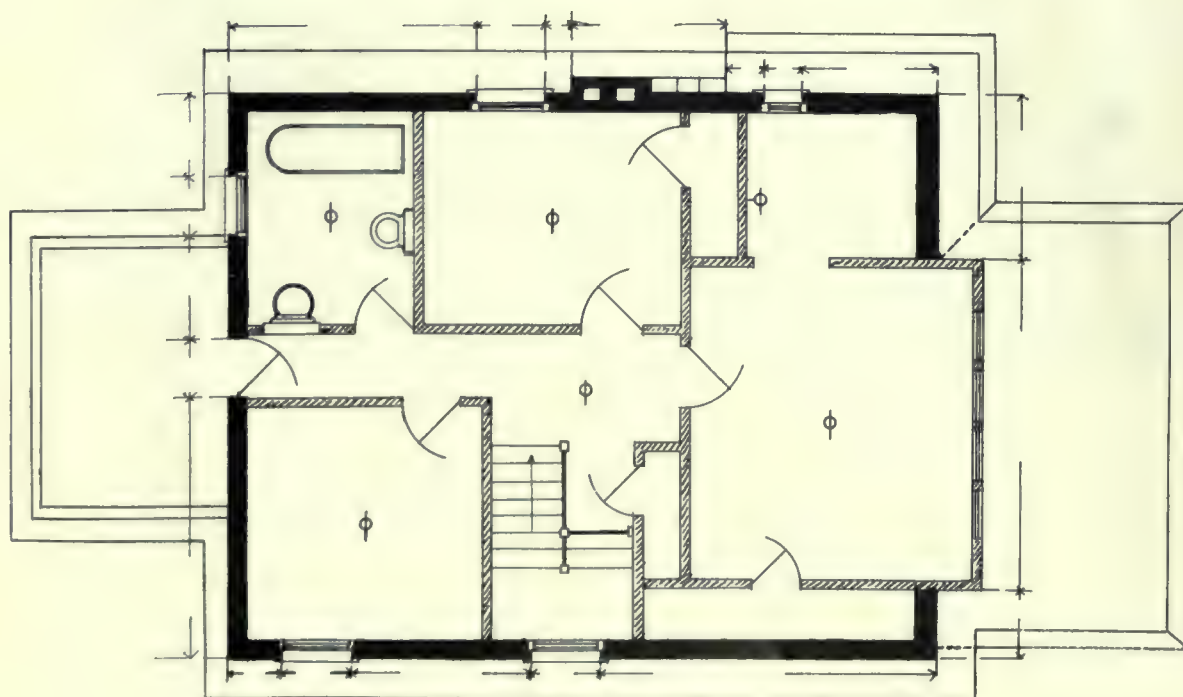
and one and two bricks in width of wall therefore forming its own bond with the brick work.

This material is specially adapted for buildings where solidity and massiveness of appearance are the effects desired, and combined with the boldness of outline and symmetry of the joints, the finished building is all that be can be desired in concrete construction.

The illustrations show a bungalow located on Gladstone Avenue, near College Street, in Toronto. The walls are solid, furred and lathed, insuring a perfectly dry building. No sacrifice of appearance for strength has been required, both being embodied in the building. There is no monotony of appearance in the wall surfaces, even the color is made of blended cements, causing a variation of shades.



Basement Plan.



Second Floor Plan.

Bungalow to the average person means a cosy comfortable abode not too large and yet not too small, it demands to be heavy and massive in appearance, and built low down to the ground. This in turn, demands low ceilings and heavy trim.

The cut shows just such a building. The massive and symmetrical appearance of the masonry, combined with the heavy overhanging roof, supported by the large gable brackets, the solid verandah and the broad high chimneys, all lend themselves to the pleasing effect much desired.

The interior arrangement is a variation of the usual class of small dwelling.

The verandah is large and roomy, with a side approach.

ning, resembling the kitchenette of the modern apartment house. It has been designed for a maximum of convenience and minimum of labor and space. The table, cupboards, are all built in. The sink is provided with a special drip board. Provision is made only for gas cooking.

The cellar is deep and provides for ample storage and heating facilities, entrance being afforded both from the interior and exterior of the house.

The second floor contains three fine bedrooms besides a bathroom. All are provided with clothes closets.

In designing any building with a long sloping roof, it is difficult to utilize every inch of space, and still maintain square ceilings. In this instance, the designer seems to have



View of Living Room, Looking Towards the Dining Room.

The vestibule is roomy and affords an entrance to both the parlor and living room.

The parlor is comparatively small, but plenty large enough for the requirements.

The living room is the main feature of the plan. Its cozy ingle nook, beamed ceilings and attractive fire-place all combine to give it a most attractive and home-like appearance.

The stairway is separated from the main entrance; this with the separate entrance to the parlor, obviates the necessity of a rear stairs.

The dining room is of a size in keeping with the rest of the house. The kitchen has been the result of special plan-

readily accomplished it since all the ceilings are full height.

The verandah at the back adds much to the comfort and appearance of the whole.

The trim on the first floor is chestnut with red and white birch flooring. Yellow pine and oregon pine are used on the second floor, the floor being of yellow pine.

The approximate cost of this building was about \$3500.00.

Mr. W. J. Robson was the builder. The house has attracted much attention and favorable comment. Already he has secured contracts to build several houses of the same materials, according to slightly varying designs. Cement stone construction so intelligently handled is bound to make advancement in the near future.

The Width and Arrangement of Streets

A Study of Town Planning with Respect to Thoroughfares which are Relatively Uninviting to Traffic, and their Economic Effect in Regard to Rents

By Charles Mulford Robinson

It is well to begin any discussion with a definition of terms. Let us say, therefore, at the very beginning, that the phrase "minor residence streets," as used in the title of this paper, may be treated as a definition. Its wording excludes all main highways, all avenues, and boulevards, and for the purposes of this discussion it shall be held to exclude all streets which carry a through travel that so much as even equals the traffic originating and terminating within the street itself. Accepting this as our understanding of the term, we shall exclude also from our consideration all streets that carry car lines or that are routes convenient for general teaming, driving and motoring.

Thus it is clear that the paper will be dealing for the most part with streets that are relatively uninviting to traffic, either because of the special development of other thoroughfares, or because of some physical handicap of their own, such as indirection, heavy grades, or a break in continuity. Their traffic relation to the street plan of the city and its suburbs, will be mainly the harboring of the little eddies left at the side by the mighty traffic streams which flow through main thoroughfares. Because they have this character they will be generally in close connection with major streets and traffic highways. If we fancy an ideal city plan, in which arterial streets radiate from a common business centre, we shall expect to find the minor streets located between the radii. They will not be limited, that is to say, to any one residential section of the city. They do not exclusively belong to any one class of citizens. Necessarily, therefore, they vary in character. The shack-lined alley off a third-class business street, and a private "place" off a fashionable avenue will alike be considered here as "a minor residence street."

It is obvious that the streets which are to be discussed are very numerous and of much importance in the city's life. They are more numerous, indeed, than any other single class of streets; an imposing proportion of the total number of citizens dwells upon them, and the lives of these people are intimately affected by the character of the streets. The streets are minor, considered only in themselves and their street relations; they are not minor as regards their social value or their economic influence upon rents.

As this paper is to discuss the latter point, it is well immediately to emphasize the fact that their economic influence, for good or ill, is not their only influence. A moment's reflection explains this: Between two minor residence streets, or between two well defined divisions of one of them, there may be the diameter of the whole social structure. If, then, even the width of these streets be standardized so that they all tend to uniformity, and the lives of the residents are not, and cannot be, reduced to a fixed social mean, there must inevitably result a series of misfits, of which the outcome can be only prodigality, social inconvenience and a general maladjustment to real conditions. There are other ways in which standardization means extravagance

and maladjustment; but I shall here speak of only the one matter of width.

In so doing, I take up the economic effect, as regards rents, because it is the easiest measure of cost; and that effect, of course, carries suggestion of many far reaching tendencies which necessarily develop from it. As the English have set forth the matter in convenient statistical form, and the principles are the same in either country, I avail myself of some English figures.

Alderman W. Thompson, chairman of the National Housing Reform Council of England, in his valuable compilation, "Housing Up to Date," states that under modern conditions of subdivision the cost of roads, sewers, etc., reaches in some cases as high as £9 per room, or £45 per cottage, and that it averages £9 per cottage. This calculation is based on statistics covering thousands of cottage dwellings, and since the word "cottage" means in this connection houses built in continuous rows—that is, dwellings that occupy with their grounds a minimum street frontage—it reveals the effect on rents for even the cheapest homes. As to the more costly villa type of dwellings, the same authority notes that the English by-law requiring a paved or macadamized road surface of about 40 feet, has made the cost of thoroughfares, in newly developed estate on the outskirts of towns, from £200 to £500 per acre—"or more than the land itself."

John S. Nettlefold, in his "Slum Reform and Town Planning," calculates that the interest on the expenditure for street work "comes to one shilling or more per week on a house rented for six shillings, if the number of houses is restricted to fifteen per acre." One must read that statement twice to get its full significance, and must realize that the suggested restriction is not a low one. At Bournville, the houses are restricted to eleven to the acre, and at Hampstead Garden Suburb to only eight. Yet at fifteen to the acre, one-sixth or more is added to the weekly rent by the English by-law requirement of forty-foot streets.

Raymond Unwin puts the unreasonableness of the requirement in this striking way: "A mansion such as Chatsworth or Blenheim will be adequately served by a simple carriage drive from 13 to 20 feet wide. The population of such a building will be larger than that of a row or group of cottages, and the amount of wheel traffic to and from it many times as great; yet for the cottage road asphalt or concrete paved footpaths, granite curbs and channel, and granite macadamized surface, the whole from 40 to 50 feet wide, and costing with the sewers, etc., from £5 to £8 a lineal yard, are required by the local authority, under our existing by-law."

The burden of all this cost, to which is to be further added the value of the land thus withdrawn from productive use, is borne by the occupants of the district, whether they be tenants or owners. Now, as a tenant, in choosing his house theoretically chooses the best he can afford, it can be argued that the rent factors which are imposed by the community in its official capacity, and without his permission, really go far to fix the scale of his living. And this clearly is true, even when admitting that the normal tax rate has of itself—

This paper, read at the Third National Conference on City Planning, held this week in Philadelphia, summarizes two chapters from a book entitled "The Width and Arrangement of Streets: A Study in Town Planning," soon to be published by Engineering News Publishing Co.

as economists now quite generally claim—little effect on rents. The importance of the subject thus becomes clear. If the present method of standardization is unduly extravagant, it should not be permitted to persist simply through inertia and because it saves trouble in surveying and thinking.

The new town planning act in England recognizes the condition, by permitting English local authorities, in order "to secure proper sanitary conditions, amenity and convenience" to relax or modify former requirements, breaking away from the tradition that all streets should be of like width and like strength. Furthermore the act itself recognizes three distinct grades of roads—main arterial, secondary and residential.

Further interesting testimony is given by the Germans, who in the earlier days of deliberate town planning were wont to construct very broad streets when developing outlying areas. For example, in the discussion which followed the presentation of my paper on this subject at the Town Planning Conference in London, last October, Dr. Hegemann of Berlin, traced the relation of cause and effect between the wide streets and the tenements with which those streets are lined in the more remote portions of the German capital; while Thomas Adams, of the town planning department of the local Government Board of England, said that after investigating conditions in Germany and Sweden, he had come to the conclusion that the system of high tenement block dwellings was as much the result of wide roads, as wide roads had been the result of the tenement system. The one, he said, was complimentary to the other. It was necessary that the owner extract from each yard of his frontage enough rent to pay its share of the costly street.

At the same conference Dr. Eberstadt, in a formal paper, told how English visitors are driven about the German cities and shown imposingly broad streets "with a display of asphalt that would empty half the pits of Italy, and a show of granite sufficient to level down the mountains of Sweden, lined all along with huge five or six-story tenement barracks." Some English visitors, he added, were full of admiration for this sort of thing; but he testified that the Germans, who have had the opportunity to study it at close range, "now wish to do away with it, as far as may be practicable, and to make their aim the English home, the cottage, the individual house."

That in England and America broad streets, in areas where the poor are congregated, are not—save in New York—as commonly lined with tall tenement barracks as in Germany does not mean that the same economic law is not in operation, or that it operates less unfortunately. A social repugnance to the big tenement, except as a last necessity, has led to the construction of small houses (often more crowded per room, and less sanitary, than is the tenement block) and then, to squeeze from the land the higher rent necessitated by the cost of frontage on an expensive street, has induced the construction of another house, sometimes a small tenement, on the rear of the lot. These houses, hidden by the structures in front are uncontrolled by ordinary police inspection and unaffected by public observation and criticism. They become such breeding-places of disease and vice, that at last, in city after city, it becomes necessary to forbid their erection.

Of great significance, also, is the fact that if there could be cheaper minor streets for residence purposes, less capital would be required in the development of estates, less land tied up for want of the capital, and more land thrown open for building.

Perhaps we may not think it part of the town's business

to build decent dwellings for its poorer citizens—though in Europe the clearance of slums and the rehousing of the people thus displaced has been accepted as a very important, and also very costly, part of municipal activity. Yet we must recognize that the city should at least do what can be done, by the wise building of streets, to encourage good housing. In its purpose to make citizens, rather than simply to add to the total of street area, it must avoid, as far as it may, whatever fosters the "warehousing" of men, women and children in tenement barracks; it must discriminate between shelter and "home," seeing in the latter more than simply the four walls of a dwelling; it must realize that a policy which provokes unwholesome methods of living, through compelling a too intensive use of the land, drains the municipal treasury in other and more serious ways than simply for the cost of making and maintaining needlessly broad streets. The maintenance of health and morality among poor people who have to live on lots of high priced frontage, is a more expensive business than is the maintenance of the street. And failure in it is a more serious matter to the community.

But it is our duty to consider the owner as well as the tenant. In fact, the ideal would be a condition in which each citizen would own his own home, the tenant becoming a relatively negligible quantity among the multitude of lot owners.

Fortunately, it does not always happen that the tenant's gain is the owner's loss. If the narrowing of minor residence streets tends to reduce rents, it does not follow that it tends to reduce property values. The latter are for the most part—as regards property of this character—the capitalization of net income, expected if not realized. A reduction in rents, which results from reduction in carrying charges, may leave net income unaffected.

But this does not mean that a method of street designing adjusted to street needs would not have any influence upon property values. Real estate would feel its influence in various ways.

In the first place, it would tend to create stability in values. This effect would be seen alike on the main thoroughfares and on the minor streets. The concentration of through travel upon certain streets would raise the value of the frontage on those streets for commercial purposes; while the assurance that intermediate streets would not be encroached upon for business purposes would not only settle definitely the business character of the chosen main highways, but would have a beneficial effect upon property on the intermediate streets. The reason for this is the certainty which would be then gained that they would be free from the danger of invasion by elements inconsistent, and out of harmony, with their present use. The more certain, it has been well said, a man can feel that the character of any given street is fixed, the more he is willing to pay for the privilege of having a lot on that street, if it is the kind of street he wants. He justifies this willingness from an economic standpoint by the argument that the property, for the use of which he desires it, will not decline in value.

Another effect of a more rational method of street planning, would be, as already suggested, the opening of additional tracts for building purposes. This means that fewer persons owning property on the outskirts of cities need be "land poor." There would follow a greater equalization of values between adjoining properties.

Over against the possibility of depressing effect upon values which would be anticipated from a greater supply of available building lots, is to be put the increase in demand, which

may be expected to follow an enhancement in the attractiveness of small streets. It must be clear that streets which follow more nearly the topography, which make use of every natural advantage, which are narrow, grass bordered, quiet ways rather than broad and dusty highways that are hot in summer and cold in winter, would call men from the city streets with an even greater appeal than suburban tracts now call. In the announcement, issued by the Russell Sage Foundation, of Forest Hills Gardens, the following sentence, significant from this point of view, was prepared by the landscape architect: "Probably one of the most notable characteristics of Forest Hills Gardens will be the cosy domestic character of these local streets, where the monotony of endless straight, wind-swept thoroughfares, which are the New York conception of streets, will give place to short, quiet, self-contained and garden-like neighborhoods, each having distinctive character."

Though a good deal has been said about the cost of making needlessly wide streets, a factor of scarcely less weight is the cost of maintaining such thoroughfares once they are built. The man who held property on a small street would make a great saving in this respect. His saving would represent not only the economy of having to provide for the depreciation of a smaller area of street, but it would be the result of a much less rapid rate of deterioration. This is because there would be nothing but local travel to wear out the street. The present property holder on a typical suburban street is very much in the position of a man required to cover his front sidewalk with a Brussels carpet which each person who walks past his house does something to wear out. As everything is done to invite people to go through the street, and as nowadays a great many play-loving persons are riding their little velocipedes up and down—in other words automobiles—the carpet wears out very fast. The man has not awakened yet to the injustice of the demand that he provides the carpet where he does not want one, and then invite people, who are only a nuisance to him, to use it. Under the saner method of street planning, his carpet would be in his front hall. It would not wear out so fast, because no one would use it but his own household, his nearest neighbors, and the persons who came to see him. He would not grudge the wear given to it in that way, and he would find that a cheaper grade of carpet, costing less in the first place, would last as long as the body Brussels laid on the front walk. For these minor residential streets, inviting no through travel, would be as private entrance ways to the few houses gathered upon them.

It may be said that those who own property on the main traffic highways, would be pretty hard hit by construction and maintenance charges, if all through travel were concentrated upon their streets. This is true, but there are three answers to the objection: In the first place, their property would at once gain speculative value. It would have the commercial possibilities which are to be denied to the intermediate streets, and which pay such high returns. In the second place, it would not be unfair, wherever it is demanded that wide streets be put through a residential estate for the convenience of communication between districts lying on either side of it, to require that the general body of taxpayers should pay the cost of street works in excess of what might reasonably be held to make for the convenience of the frontage and for the increase of its speculative value. Third, it is probable that, taking the city or even the neighborhood as a whole, the deterioration of pavement would be much less than under the present system. There would be a smaller street area to take care of, and some pavements, such as

asphalt, deteriorate less rapidly if they carry a fairly heavy and constant stream of travel. At any rate, by concentrating the bulk of the traffic on a relatively small number of selected streets, these could be especially prepared for it, and given a width and style of pavement calculated to handle the business with the least delay and the smallest cost for operation and maintenance. Then each purely local street could be developed in the way that would best suit the needs, the means and the taste of the people it is designed to serve.

A final consideration with reference to real estate values is, that only such a system of street designing as here proposed can make just and reasonable—that is to say, can make possible—a radical restriction of the number of houses which may be constructed to the acre. If the city is going to say to the owner of a certain tract that he can construct not more than fifteen houses to the acre, it must say to him that he will not have to pay for the development and maintenance of the streets in his tract, any such sum that thirty houses to the acre would be necessary to give him an adequate return on the investment. Conversely, if the owner is to be relieved of the cost of constructing wide streets, he must agree to a restriction of the land's human capacity—by limiting the height of his houses and their number per acre—to an aggregate giving such traffic as the street can care for

Must Plan Cities

"Some Problems in Civic Government," was the subject of an interesting address given by Mr. Charles F. Adams, of New York, formerly secretary of the borough of Brooklyn, a lawyer, who is active in the promotion of the single tax propaganda, before a small audience of city officials and others at Toronto.

Mr. Adams' chief attention was given to the wisdom of careful planning, so that unhealthful city conditions should not develop through neglect, greed, and criminality.

"It is indecent to proceed as we have been going," said the speaker, "allowing cities to go on without a plan. Evolution has been unconscious; it is time evolution should become conscious, and where cities are likely to grow we should plan to have them develop along the best lines and not become so congested that they are gangrenes of luxury."

"Toronto," said Mr. Adams, "looks so much like a great city to me, that I question whether you here are not in grave danger of not being sufficiently alert in making plans for your city. I hope, however, you have enough of that British spirit of justice and political genius to settle on and adopt early a radical conservative policy, and to plan for your city so that instead of becoming a disgrace and a scandal it shall be a place where equal opportunity shall be given to all. In all the colonies of England there is the genius of democracy to-day, and I look to them to teach the rest of the nations, including the United States, which holds the doctrine of democracy, but does not practise it so well."

In reply to a question, Mr. Adams briefly explained the commission movement, which has been brought into the charters of a hundred and ten cities in the United States.



A Look Into the Preparation of Estimates

W. Fraser.

Under this section we propose to take into consideration the various difficulties, inconveniences and expense with which contractors are beset in all departments of the building trade, and to do our best to dissect and probe into any expense which may effect the cost of any work placed in the building. We do not expect our readers to always agree with us. We shall be sorry if they do. What we do hope, however, is to provoke some discussion, so that an idea of what may be styled Canadian practice may be outlined.—The Editor.

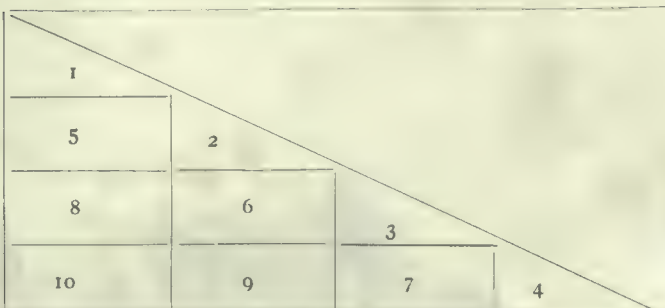
(Continued from last issue.)

Having room for the use of wagons in this cellar we will compare their cost with that of carts. The cost of the carts we have fixed at 21c. per yd. from the solid, taking 3 loads (1½ yds.) per hour. If the wagon moves 3 loads an hour it will move 4 yds., and this will cost 55c., or about 14c. per yd.

But, as the wagon will take more time on the circuit than the cart, and there are certain other conditions bearing on its use, we should add about 10% more and allow say, 15½c. per yd. It does appear that we have a saving of 5½c. in favor of the wagon and we will adopt its use at 16c. per yd. in the preparation of our prices except when conditions turn up in favor of the cart.

There are three other points bearing on the matter of expense, viz., the easy roadway, the use of the double team, and the value of horseflesh. We will analyse the use of the former and will allow for a roadway left in, 9 ft. wide. The cellar being 12 ft. deep we will allow this roadway to be 120 ft. long at the base.

As we intend to average the cost price of the total cellar we will consider the roadway by itself first. Here we will use the cart for haulage there not being room for a sufficient number of men shoveling to make the wagon profitable. We make a diagram as below and divide it into 10 blocks, 3 ft. high and 30 ft. long:—



No. 1, we will take along with the upper 3 ft. of the total surface.

Nos. 2, 3 4, picking, shovel-		
ing (once) and haulage,	45 yds. at 68c.	\$ 30.60
Nos. 5, 6, 7, picking, shovel-		
ing (twice) and haulage,	90 yds at 88c.	79.20
Nos. 8, 9, 10, picking, shovel-		
ing (thrice) and haulage,	90 yds at \$1.08	97.20
	225	\$207.00

Gives an average cost per yd. \$.92

We will reckon to handle the upper 3ft. of the cellar by spade and wagon work only and the contents as 844 yds.

The words "refill with puddled clay" come into view. This is unusual but we must figure on it. The quantity required for the refill is 180 yds.

We will plow and scrape this quantity out of the second 3 ft. deep on to the bank at the cost of 16c. per yd. Considering that the refilling will cost 40c. per yd. the handling of this portion we place at 56c. per yd.

We now deal with the balance of the second 3 ft. deep. We will plow, shovel and haul the central portion, but we must pick, shovel and haul all round the sides about 3 ft. wide. Therefore we say:—

For refill	180 yds. at 56c.	\$100.80
At sides of bank	131 yds. at 63c.	82.53
In centre of cellar	489 yds. at 41c.	200.49
	800	\$383.82
Gives average cost per yd		\$.48

We will now deal with third and fourth 3 ft. deep, which we will take up together.

Deducting the roadway blocks 8, 6, 3, 10, 9, 7 and 4, which amount to 180 yds., and also the picking around the

sides, 262 yds., the balance left for plow and shovel work is (leaving out fractions), 1,247 yds., therefore we say:—

At sides of bank	262 yds. at 63c.	\$165.06
In centre of cellar	1247 yds. at 41c.	511.27
	1509	\$676.33
Gives nearly an average cost per yd.		\$.45

Now about the general average price.

Roadway	225 yds. at 92c.	\$207.00
Surface, 3 ft. deep	844 yds. at 36c.	303.38
Second, 3 ft. deep	800 yds. at 48c.	384.00
Third and fourth, 3 ft. deep	1509 yds. at 45c.	679.05
	3378	\$1573.43
Gives an average cost per yd. over		\$.46½
To which add profit		.05½
		\$.52

and we will now enter in schedule:—

Excavating main cellar

Yards cube 3378

52c.

We will now follow up with taking off the footing trenches and entering same in our note book:—

Trenches:

4" × 2" × 152' + 137' + 42' + 32'	2904
Chimney 16" × 6" × 16'	1536
Pits 6" × 4" × 6' × 5	720
	27 5160
	191

As to price we must notice that the excavation for the wall footings, chimney and pits are subject to about the same conditions excepting the portion under the roadway. The former will be picked and twice shoveled while the latter will cost about the same as No. 9 block of the roadway.

Find the average thus:—

Under roadway	37 yds. at 108c.	\$ 39.96
General trenches	154 yds. at 88c.	135.52
	191	\$175.48
		\$.92
Plus Profit		.10
		\$ 1.02

Enter in Schedule:—

Excavating for foundations		
Yards cube 191	\$1.02	

Next comes the sewers which we will prepare for a price

per lineal yard. We prefer to take the excavation first, leaving the tiles till later and we measure and note:—

Sewer excavation

Average 12' deep × 150' + 50' × 3	300
	3 300
	100
Average 4' deep × 48' + 120' + 20'	288
	3 288
	96

To find the price we will lay out a diagram 12 ft. deep, 3 ft. 4 in. wide at the top and 2 ft. wide at the bottom. The clay will admit of being tunneled and we will figure accordingly and consider the cost of cutting out 10 lineal ft. open and tunneling 10 lineal ft. alternately.

We will first bring the different blocks into cubic yards. We measure by duodecimals, but as we have to deal with 27 ft. in a cubic yard we prefer to work out the fractions in vulgars instead of decimals, as the former is the more accurate of the two.

As to the tunneled portion, we cannot make sure of the accurate quantity but consider it at least 3 yds., and for convenience we will adjust the fraction so that when added with the opened portion it will give a complete whole number.

We will base on the same data as formerly:—

No. 1 block shoveled only	20c. per yd.
No. 2 picked and shoveled (1½ times)	57c. per yd.
No. 3 picked and shoveled (2½ times)	77c. per yd.
No. 4 picked and shoveled (3 times)	87c. per yd.
Tunnel bar work 50c. }	
Tunnel shovel work 70c. }	120c. per yd.

We will now measure and price quantities:—

No. 1—3' × 3' × 10' = 3¼ c. yds.	@ 20c.	\$.62
No. 2—2' × 3' × 10' = 3¾ c.	@ 57	1.79
No. 3—2' × 3' × 10' = 2¾ c.	@ 77	2.14
No. 4—2' × 3' × 10' = 2¼ c.	@ 87	2.19
Tunnel 3' × 2' × 10' = 3¾ c.	@ 1.20	3.88
Totals 15		\$10.42

Re-fill 13c. yds. @ 20c. = \$2.60

Haulage 2 @ 36 72

Braces, etc. 1.26

Profit 1.50

÷ 15

6.08

\$16.50

Gives price per c. yard \$ 1.10

As there are 6⅔ lineal yards in the 20 ft. we divide \$16.50 by the same and find our price per lineal yard to be \$2.48.

It is plain that the other drains which we have taken off will average 1 cubic yd. to the lineal yard, the figures being 20' + 46' + 30' and we will price this as picking, shoveling, re-filling and profit at 75c. per lineal yard.

We will now enter in schedule:—

Sewer excavation averages 12 ft. deep		
Yards lin. 100	\$2.48	
Do. averages 4 ft. 6 in. deep		
Yards lin. 96	75c.	

(Continued on page 264)

Hardwood Flooring

Some Facts About the Manufacturing and Laying of Hardwood Floors,

We have gotten away from the old method of building a plane floor and covering it with carpet, and the disposition to-day where a good house is built, no matter whether it is a cottage or a mansion, is a hardwood floor. In an office building or hotel it is used as a matter of course. The *Hardwood Record*, the leading authority on hardwood in America gives an interesting review of this kind of flooring.

In many parts of Europe oak has been used for several hundred years for flooring purposes, and the durability of this wood is shown by the condition of oak floors one or two hundred years old. Recently there was torn down in London a house, the floors of which were in almost perfect condition, although they had been laid three centuries before and had received only an occasional repairing in the interim.

While the density of the texture of oak makes it almost indestructible through wear, it is the tannic acid in it which makes it almost immune to-day. No description of the beauty of the grain and figure of the oak is needed, for this is well known to every one who has ever seen or used it.

To-day hardwood flooring is considered a necessity as well as a luxury. It is employed in the small as well as the large houses, and the difference in the grade of the wood is the only marked variation in the class of work.

Even a second or third grade floor of oak is cheaper than carpets when its great durability, cleanliness and sanitary advantages are considered. The builder of even a very modest home can afford to make his floor of oak or some other hardwood.

In the mill production of hardwood floors, the cheapening of the cost and increased satisfaction must be looked for. When the carpenter or builder cut up his own strips of hardwood and matched and planed them off to fit, the cost was naturally high and the workmanship often faulty. The advent of machinery and mills for manufacturing hardwood floors brought the cost down to the house owner even in the face of advancing prices for lumber. Moreover, the manufacturers have standardized hardwood floors so that every man knows just what he is buying. This standardization includes not only the shape and size of the strips, but the quality of the wood and its treatment. All oak flooring leaves the factory in perfect physical condition, and the carpenter has simply to follow the directions carefully and handle it with care.

One of the gains admittedly made through the improvement of machinery in manufacturing hardwood floors is the utilization of all lengths by ingenious methods of end-matching. Ten years ago only long lengths were considered of use for flooring. This meant a great waste of good material and difficulties that could not be overcome by the carpenter. To-day short pieces are not only utilized, but medium length sections are considered more satisfactory than the long ones. The process of end-matching is simple. The stock is cut at the mills to meet all such requirements, and the carpenter who understands his business can work around short corners and in alcoves just as satisfactorily as elsewhere.

The manufacturers of flooring have standardized both the width and thickness of the strips, which is another economy in lumber and labor. The three standard thicknesses used are 13-16-inch, 7-16-inch, and 3-8-inch. These are found to be the most satisfactory from every point of view in laying old or new floors. The first size can even be laid with perfect end-matching without any under floor so that an economy of material is obtained. This is particularly of value in summer houses where no double flooring is needed to keep out the cold winds. Narrow widths are now considered more satisfactory than wide ones, and experience has shown that a floor laid in this way is really more durable than one with two or three-inch strips. The narrow strips lay flatter, and stay in position, and there is no danger of cupping. The appearance of the floor is also better, for the grain and color of the wood can be blended more harmoniously and there is less danger of wide interstices between the sections. The strips can be laid closer together and held there without danger of springing.

A fact not always appreciated by inexperienced hardwood floor layers is that the stock which leaves the factories is not like ordinary lumber, subject to warping and springing. The physical properties of the wood are perfect. To begin with the wood has been carefully kiln-dried, cooled, and then milled accurately. After that it has been stored in well-ventilated warehouses and shipped in perfect condition. For this reason floor layers should not handle it as ordinary lumber. In the first place it should not be unloaded and transported on rainy days or exposed to a damp atmosphere. Likewise it should be stored only in well-ventilated places free from moisture. Flooring piled up in open sheds will quickly deteriorate, for the amount of moisture it will absorb thereby injures it. The stock swells and ruins the perfect mill work. Hardwood flooring is intended only for interior work, and therefore it should be treated as such. The floors should be the last work in a house. If laid before the plastered walls have dried thoroughly, there is danger of warping and swelling due to the excess of moisture absorbed from the wet walls. Yet this mistake is quite common, and good floors hopelessly ruined.

Hardwood flooring stock is made by the mills in several grades, but the demand is more largely for the first or best grade for ordinary house finishing. On the other hand it has been demonstrated in a practical way that the other grades have almost as long a life of usefulness, but the first appearance of the floor is not so satisfactory. As a matter of fact, however, builders who have the interest of their clients at heart can do much toward recommending the various grades for different parts of the house. Thus the first grade of quartered oak might be used for the drawing-room, and the second grade for halls and other rooms. The first grade of quartered oak flooring is made from selected lumber, and it is the best that can be secured. The wood is clear and free from knots and defects. Color does not enter into the quality of the wood, but the face of it must at least be perfectly clear. The second grade of quarter-sawed oak flooring must be practically free of defects, but the face is

not so perfect as the first. Both grades are suitable for high-class dwellings.

In the plain-sawed oak flooring, the price of the first grade is about the same as that demanded for second-grade quarter-sawed. The second grade of plain-sawed oak may have pin-worm holes, but otherwise the face is pretty clear of defects. The lower grades of plain-sawed flooring may contain many defects such as knot holes, but is good enough to lay a serviceable floor that will last. The choicest grades have certain wood markings which increase their value, and the selection of special lengths to match other strips is always an increased expense.

There is very little difference between the best grades of hardwood flooring. It is largely a technical difference, although the grain and figure sometimes count a good deal. A good floor layer can make an excellent job with any of the top grades, and even with the common plain-sawed strips an expert can produce wonderful results.

The lower grades of plain-sawed oak are intended chiefly for factories, warehouses and cheap tenements. The stock is made with this idea in view, and is cut to withstand heavy wear. Special factory stock is made by the mills to resist the wear and tear of heavily-loaded hand trucks, and the durability of hardwood floors was never better demonstrated than in this service. Hardwood floors of stores and factories have resisted the rough usage of heavy trucks for years without breaking down.

The grade of flooring, suitable for factory and cheap tenement houses, costs approximately one-half less than the first grades employed solely for private houses. The oak is often as good and serviceable as that used for the best work, with the exception of pinholes and slight defects of color and figure. The wood is just as durable, and in many respects presents as fine an appearance when laid and finished. Another use for the lower grade of hardwood flooring is for the center of large rooms with a border of more expensive wood around it. As the center of the room is covered with rugs, the cheaper oak is not noticeable, and the selected strips for the border carry out a perfect finish. From sixty to seventy per cent. of the cost of wood for the flooring is thus saved.

The mills make one-and-a-half to two-inch wide strips for ordinary flooring, but special widths can be ordered. The advantage of the narrower strips is evident for ordinary rooms, but for very large rooms the two-inch strips are probably most satisfactory. Still with the improved end-matched strips, it is possible to nail any of the narrow widths so that the nails will not show, and the finished floor is almost perfect. The narrow widths when properly laid are less subject to atmospheric changes and conditions, and for this reason as well as superior finish this type of floor is most in fashion.

While oak is the favorite wood for flooring, a good many of the other hardwoods are employed, especially the maple, birch and beech of the North. The darker woods are useful for borders and contrasting designs. Our native black walnut is an excellent wood for borders, and it is used extensively. Circassian walnut is popular for border effects, and also many of the grey woods. These latter are largely imported in the log, and then cut in appropriate sizes by the mills in this country. Mahogany has its limited use for flooring, and will always be needed for certain border effects.

Hardwood flooring that comes from the mills tongued

and grooved to end match other strips is easily put down, but a little expert knowledge is necessary for a good job. The various improvements of hardwood flooring include so-called wood carpet and other devices. With the strips of wood cut and laid on some material used for a stout backing, and glued firmly in position, the carpenter has little more than to cut to fit measurements. This method of laying wood floors is popular for show windows and other places where there is no wear or tear to amount to anything. But large quantities of it are also laid in private houses, especially in bedrooms and smoking-rooms where usage is light. For rooms and halls where the wear is extensive there is no substitute for the hardwood strips cut and laid with tongue and groove, and nailed firmly to an underfloor. Floors thus laid will last a lifetime, and will give satisfactory service.

The increased use of hardwood floors has stimulated the growth of a branch of carpentry that was formerly of little account. Wood scraping machines are made by the thousands to-day, and those adapted to hardwood floors simplify the problem of rejuvenating them. Scraping, however, is due largely to the result of neglect and carelessness. Hardwood floors get stained and dirty through improper care, and then the only way to clean them satisfactorily is to scrape them. Fine hardwood floors may also be injured by scratching with heavy furniture carelessly moved across them. Such marks, too, can be eliminated only by the scraping machine. A properly laid hardwood floor given the ordinary care bestowed upon carpets and rugs will last a lifetime without the need of scraping, but if neglected and abused for a few years the surface may get into such a condition that scraping is the only remedy. There is as much education needed in the art of caring for hardwood floors as there is in laying them.

A Look Into the Preparation of Estimates

(Continued from page 262)

With a sigh of relief we feel that we have finished the excavation. It is always troublesome to get at accurately owing to the many changes in its conditions. Though our principles are to be governed by three different motives; viz., first, accuracy; second, speed; and third, saving the brain, we feel that we have rather been actuated by the second motive and have made some errors. But we assume that an error becomes no error when you are aware it is an error.

Giving the matter a second thought, our feeling is that we have priced the work pretty low, especially in the main cellar. But, as we are partners in the firm of Messrs. Supply, Demand & Co., we feel compelled to adhere to their principles. We are haunted by such thoughts as "the horses are eating their heads off in the stable," and the men "are hanging around there doing nothing, while we have to pay them." The consoling thought is that if we are low it is our own business and not our neighbor's. As we tender in a lump sum no one knows what our rate price is, not even the architect. When things get busy instead of our rate price being 52c. per yd. the chances are, if it is lump sum tendering, we will jump up to a dollar or more, and thereby help ourselves out.

We will now turn on to the next department in order, which appears to be concrete work.

(To be continued.)

Some Common Mistakes in Installing Warm Air Furnaces

Three Actual Cases Discussed Showing Some Things to be Avoided.

Mr. M. H. Smith, in a most valuable and interesting series of papers in *The Master Sheet Metal Workers' Journal* has discussed rather fully the question of warm air heating. To illustrate his points he has from time to time taken actual cases which came up in his own practice. An examination of a few of these will show our readers a few of the points which ought to receive some consideration, and help to avoid the errors made by others.

There can be no doubt that in the cases of hundreds of unsatisfactory heating jobs in the country, that fault lies entirely with the installations, not in the furnace supplied. The thought often arises, why do not the manufacturers see that those responsible are more thoroughly trained to avoid mistakes.

Of course, in the case of the speculative builder who shaves to the closest cut, the dealer is powerless, unless he turns down the job rather than install a plant that he knows must prove inefficient to do the work required.

Some of the mistakes in warm air furnace heating arise from a lack of knowledge of the laws and forces that govern heating engineering, but this lack of knowledge, less politely termed "ignorance," is totally inexcusable, he maintains, because the information that would dispel this mantle of ignorance is as free as the air we breathe, to those whose ambition will develop a desire to read and study.

Some of the mistakes are due to gross and inexcusable carelessness, but these may be avoided by the furnace man whose pride in the result of his work should prompt the exercise of reasonable care.

Some of the mistakes are due, neither to ignorance nor carelessness, but are without difficulty directly traceable to the architect and builder, whose interest in the subject of efficient warm air furnace heating—a subject of vital importance and considerable interest to the occupant of the house—ceases when the deluded purchaser has paid for and accepted title to the property, and frequent experiences in the mistakes of warm air furnace heating warrant the assertion that the fault too frequently rests with the architect and builder.

A FURNACE "MISTAKE."

For example, a house completed less than a year ago in a certain small town, presents a striking example of the "mistake" which cannot be placed in either the ignorance or careless column. In this case the question was not what will it cost to satisfactorily warm the dwelling to be erected, but how much of an outfit that looks like a heating plant can be furnished and installed for seventy-five dollars? What a proposition to emanate from a contractor's office!

The construction of the house was begun, and in due time the plans and specifications for the heating were passed to the furnace man, who, in spite of his better judgement, proceeded to install the plant in accordance with the architect's plans and specifications.

The specifications stipulated a furnace by name and number—one that has a casing 32 inches in diameter and a

fire pot of 13 inches average diameter, and this to warm a stone and frame dwelling entirely exposed, containing nine rooms, kitchen and bath, and aggregating—considering wall and glass exposure—fifty-six thousand gross cubic feet. The specifications further provided for 8 by 10 inch registers in each room, four runs of 8-inch warm air pipe from the furnace to four risers $2\frac{3}{4}$ by 9 inches each, one of the risers intended to warm three rooms, and three of them intended to warm two rooms each.

The house, when nearing completion, was sold—like-wise the purchaser, who, perhaps having experienced some disappointments in warm air furnace heating, asked for a larger furnace and agreed to pay through the architect an additional sum for a larger sized furnace. The same careful (?) consideration induced the architect to merely order the larger furnace, and when reminded by the furnace man that the round and partition piping was neither large enough nor enough of them, was told that no change in the plan of piping, flues and registers would be considered. This heating plant was completed as arranged by the architect, and when tested during the subsequent cold weather proved, as might have been expected, a miserable failure. Now, the architect, the contracting company, the builder and the dealer are each busy trying to convince the purchaser of the property that some one of the other three is responsible for the mistake.

Note the original plan:

House contains gross cubic feet	56,000
The No. 32 selected furnace would heat gross cubic feet.....	19,000
Maximum limit of piping for the No. 32 furnace, inches, area is	280
Four 8-inch horizontal pipes, inches area.....	200
Four risers or partition pipes, $2\frac{3}{4}$ by 9 inches, area ..	100
Aggregate area of nine registers, in inches	360

Notwithstanding the furnace specified was entirely too small for the proposition, it was, nevertheless, of greater efficiency than the round horizontal piping, and very much greater than the risers or upright pipes, but how much more unevenly balanced is the amended proposition:

The No. 40 furnace used with heat gross cubic feet. . . .	54,000
Maximum limit of warm air piping, inches area.....	440
Four 8-inch horizontal pipes, inches area.....	200
Four risers or partition pipes, $2\frac{3}{4}$ by 9 inches, area ..	100
Aggregate area of registers in inches.....	360

We know that a warm air furnace heating plant is measurably elastic, but neither the intended furnace nor the larger substituted one would be sufficiently elastic to cover the defects in this exhibition of an architect's heating engineering ability.

ANOTHER EXAMPLE.

Plans were presented for the erection of a bungalow, warm air furnace heating specified. Mr. Smith examined the plans, showing six rooms, kitchen and bath to be heated, and recommended the use of a certain No. 35 warm air

furnace of modern type, the specifications of which might be briefly stated as:

Diameter of casing in inches.....	35
Average diameter of fire pot in inches	18
Diameter of smoke collar, in inches	8
Heating efficiency, in gross cubic feet.....	35,000

(Gross cubic feet means the actual cubic feet plus the net wall and glass exposure multiplied by seven and one-half and seventy-five respectively.)

The bungalow, by measurements from the plans submitted, measured 33,400 gross cubic feet.

The furnace man who installed the plant put up a creditable job, mechanically speaking, but for some unaccountable reason reduced the smoke pipe from eight inches to five and one-half inches, the effect of which was a sluggish, lifeless fire and a complaint from the house owner that only cold air came into the rooms through the registers. The furnace man was called in, his inexperience prompted him to close off all air supply at the base of the furnace (the air having been supplied by the basement in which the furnace set) and extended an air duct eight inches in diameter from the base of the furnace to a west window in the basement.

Of course the result of this example of engineering was the admission of only sufficient air to fill one of the runs of warm air pipe and to perplex the owner, who said, "At first we had air from all the registers, now we obtain moderately warm air from only one register at a time." At this stage the writer was called in, and a brief examination disclosed the entire difficulty, namely, insufficient draught. The diminutive air duct was removed, an adequate air supply taken from the basement, the smoke pipe increased to eight inches. Result, a brisk, active fire, improved combustion and all the rooms of the bungalow satisfactorily warmed to a temperature of 70 degrees in zero weather.

In this instance the funniest mistake, first, was the needless reduction in the diameter of smoke pipe; second, in attempting to supply air for warm air piping aggregating 350 inches area with one 8-inch pipe—fifty inches area.

INSUFFICIENT AIR SUPPLY.

Another example of inexperience on the part of a furnace man, and a condemnation of warm air furnace heating, on the part of a house owner was presented during the past winter. Mr. Smith was called in to determine, if possible, why only one room at a time could be warmed. A brief examination of the system disclosed many mistakes in the heating plant, chief of which was an insufficient air supply. The maximum warm air pipe efficiency was about 360 inches area, the furnace, however, having been installed with two runs of 10-inch and two runs of 9-inch and two runs of 8-inch warm air piping, aggregating 384 inches area. All air from the cellar to base of the furnace had been excluded and a 4 by 12-inch tin air duct run from the base of the furnace to the seat wall, where some bricks had been removed and the opening covered with a 4 by 12-inch register face, actually admitting only 24 inches area of air supply 384 inches area of piping. Can any one be surprised at the effect and the annoyance to the family?

Immediate relief was afforded by the removal of the toy air duct and the blind panels at the base of the furnace, and partly opening one cellar window to permit a circulation of air in the cellar. This produced a change in the temperature of the rooms, but not in the hall, which was served with

a floor register. To temporarily produce a different effect here we resorted to the old trick of placing upon this register a joint of warm air pipe, which carried the warm air above the strata of cold air on the floor and permitted the warm air to freely flow from this register into the hall.

When one considers the number and variety of mistakes in warm air furnace heating which have a strong, a very strong, tendency to prejudice the average householder against warm air furnace heating, it would seem to emphasize the necessity for establishing in each state a system of issuing permits to mechanics after an examination as to their ability to install a warm air furnace in a scientific manner.

Many examinations of defective warm air furnace heating plants disclose the fact that too little attention is given to both air supply and draught. Without a supply of air at the base of a furnace warm air cannot be obtained in the rooms, and this fact is so simply plain that we are more than surprised that any mechanic capable of installing a warm air furnace does not readily understand this feature.

No warm air furnace has a draught of its own. This must be supplied by the chimney and the smoke pipe leading from the furnace, and unless these be properly constructed and proportioned it would be useless to look for good results from an otherwise correctly installed warm air furnace heating plant.

The Effect of Decorations on the Light of a Room.

Too little attention is often given by house owners and tenants to the question of light; the opinion is only too often held that if there is not sufficient light in a room it is the fault of the windows or of outside circumstances, but often the fault is to be found in the fact that such light as comes into a room is not properly conserved.

The color of the walls has a great effect on the lighting of a room, as all colors absorb a certain amount of light. A room covered with black paper, for instance, requires much more lighting than one tinted pink, but the following table compiled by an illuminating engineer gives a comparison of light absorption which should be useful where it is determined to make full use of all the light which comes into it.

Material	
White blotting paper.....	18 p.c. loss
White cartridge paper.....	20 p.c. loss
Chrome yellow paper.....	38 p.c. loss
Orange paper.....	50 p.c. loss
Light pink paper.....	64 p.c. loss
Yellow wall paper.....	70 p.c. loss
Yellow cardboard.....	70 p.c. loss
Light blue cardboard.....	75 p.c. loss
Emerald green paper.....	82 p.c. loss
Dark brown paper	87 p.c. loss
Vermilion paper.....	88 p.c. loss
Black paper.....	98 p.c. loss

The Use of the Paint Brush

Advantages to be Derived From the Correct Action of the Arm—Information on Cutting in Sashes and Trim Generally—Bridling, and How it is Done—Care of Brushes.

By A. Vaughan Wiggins.

The painting trade is full of men who have just dropped into it mechanically, as it were, who do not know the first thing about the use of the brush.

An old-fashioned and good way to find out whether a man is a painter or not is to give him a brush and string and ask him to bridle it. The painter who knows how to use a paint brush can cover 50 per cent. more surface in a day and with less exertion than the man who does not know how to use the brush.

USE THE ARM FROM THE SHOULDER.

The great mistake most painters make is that they use their arm from the elbow instead of from the shoulder.



Fig. 1.

Just as in walking, the man who uses his legs from the hips will walk twice as far with less fatigue and in quicker time than the man who uses his legs from the knees. The reach of a man using his arm from the elbow is about 26 to 30 inches, while the reach of a man using his arm from the shoulder is about 50 to 55 inches. You can demonstrate this fact to yourself and you will readily see that a man using his arm from the shoulder will cover the surface quicker, as he won't want so many "shifts." In painting a large wall or ceiling the best and quickest method is to take a full brush and lay parallel strokes about 3 or 4 inches apart (see Fig. 1). You must have a full brush to each stroke. Then, without dipping your brush in the paint, draw the brush across the parallel strokes and spread the paint each way (see Fig. 2). You have now covered the surface and can stipple, or cross it again and lay off lightly. This method is much quicker and easier than the usual method of brushing the paint on

any old way with short arm strokes, spreading it unevenly with the maximum amount of labor.

CUTTING IN TRIM.

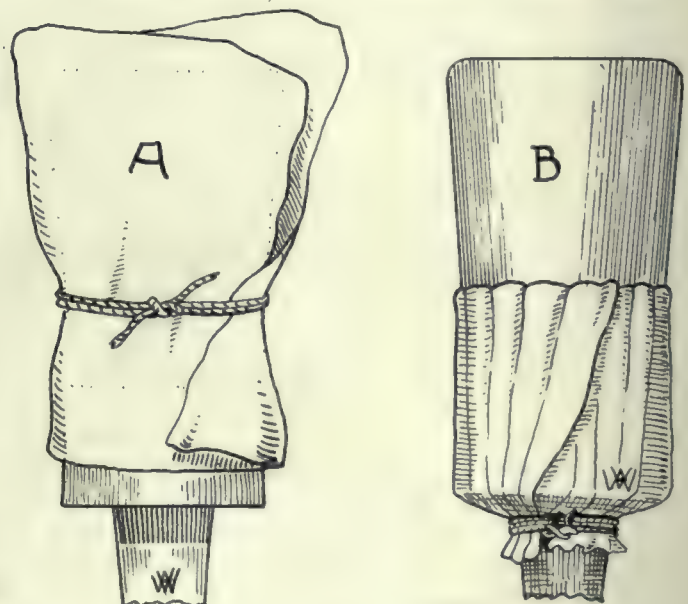
In cutting in sashes and trim generally use a full brush and do as far as you can reach in one stroke. Don't try to



Fig. 2.

"cut in" with a semi-dry brush in short strokes: you will be working hard and accomplishing very little. For cutting sashes in, a half-worn tool is better than a new one.

If you are going to stipple the surface apply the paint



as directed above, but do not lay it off, the stippler will spread the paint evenly.

In using the stippler do not "pound" the surface you are stippling. This is a very common fault, even with good mechanics, and is very hard on the stippler. It is not neces-

sary to belabor the wall or ceiling. You are not supposed to be trying to knock holes in the plaster, and you are only tiring yourself out. Use the stippler as you would your child—firmly but gently.

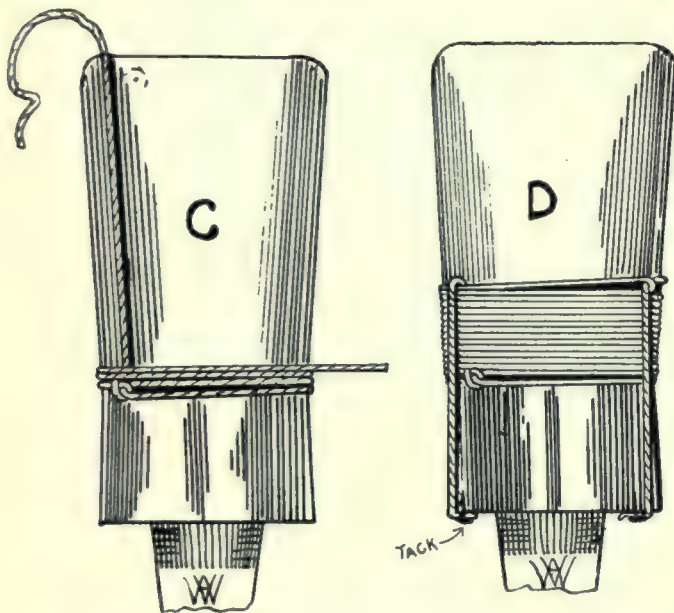
BRIDLING BRUSHES.

There are many ways of "tying up" or "bridling" a brush, some of which I will endeavor to illustrate and explain.

Sketch A.—After tying a rag in manner shown, pull it back and fasten to handle, as in Sketch B.

Sketch C.—Starting to wind the string from the heel to as far as you want it to go, then finish by tacking the two ends of string to the "butt," as in Sketch D.

Sketch E.—Start to wind the string at the place you

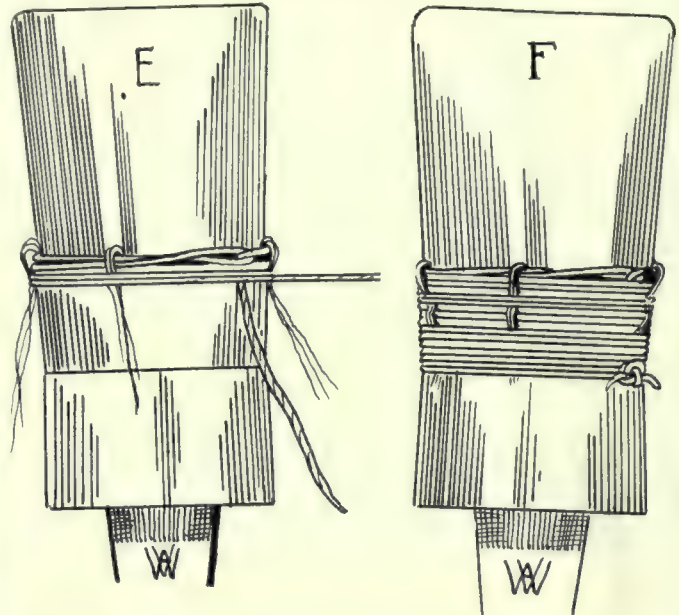


want the bridle to stop, then pull down a few bristles here and there over the string, so as to prevent the bridle slipping up and bringing the bristles over and under the string to hold

them fast. Finish by tying the two ends of the string together, as shown in Sketch F.

CARE OF BRUSHES.

The practice of carrying paint brushes not properly washed out, in a grip, until they are hard and dry is neither



workmanlike nor sensible. If you *must* carry them in your grip, then, after washing them out in benzine, soak them in raw linseed oil and wrap up in thick paper so as to exclude as much air as possible. By treating them in this way they will keep soft and workable for some time.

Stipplers should always be washed out in warm water at the close of the day's work, and ought never to be left in water or paint until the day after. This latter method is slovenly.

No mechanic takes less pride in his tools than the average painter. Yet no tools require more constant care than the painters'.—Written expressly for the Acton Publishing Co., Limited, by A. Vaughan Wiggins.

Color and Hints on Color Harmony

An Important Subject to the Painter—Working Knowledge of Color Harmony Acquired Only Through Long Experience—Treatment of the Various Colors.

This article is written for the working painter or master painter who has not yet given much thought to color harmony.

Color harmony is, or ought to be, a very important subject to the painter. No matter how skilful a mechanic you are, if you are not a good colorist and know nothing of color harmony you are a long way from being a first-class mechanic.

A working knowledge of color harmony can be acquired only by long experience.

You may read, mark, and learn about the principles and theory of color harmony, but you cannot put those principles and theories into practical and proper use without practical experience.

Read and study all the books on color harmony you can

get hold of. Patronize the local reference library if there is one in your town; then when you have read and studied the subject well, you will be better able to make use of the knowledge gained by actual experience.

Primary colors are colors that cannot be made by mixing two or more colors together.

The three primary colors are: Red, blue, and yellow.

The colors got from mixing any two of the primary colors together are called secondary colors. There are three secondary colors, called purple, green, and orange.

Red and blue gives purple.

Blue and yellow gives green.

Red and yellow gives orange.

By mixing any two of the secondary colors together we

get what are called the tertiary colors, citrine, olive, and russet. Thus, orange and green gives citrine, green and purple gives olive, orange and purple gives russet.

Black and white are not regarded as colors.

A good black can be produced by mixing the three primary colors together in proper proportions.

By adding white to any color you produce a tint of that color. By adding black to any color you get a shade of that color. That is the difference between "tint" and "shade."

The use of black subdues or lowers the tone of any color to which it is added.

To preserve the richness of colors when you wish to darken them use the primary colors instead of black; for instance, to make a yellow darker use red and blue; to blue add red and yellow, and so on.

Every shade or tint of color required by the painter can be made from red, blue and yellow with black and white.

To make any of the umbers or siennas lighter in color and to preserve the clear richness of tone, always use lemon chrome instead of white. If you want a subdued or muddy umber or sienna color then use white.

The most useful primary colors are:

Yellows—lemon, chrome, deep ocher.

Reds—vermillion, Venetian red, crimson lake.

Blues—Prussian blue, ultramarine.

Gold and silver leaf harmonize with all colors, and with black and white in small quantities; can be used to bring into harmony the most glaring colors.

The old time heraldic painters knew the value of outlining their strong primary colors with gold, silver, black or white, so as to bring them into harmony one with another. The ancient Egyptians and other peoples made use of the same knowledge in their decorative schemes.

Yellow ocher is the most useful color the painter possesses. In its pure state it is admirable for large wall spaces, and if you are in doubt as to what color to use to complete a color scheme you will find ocher or one of its shades or tints will in nine cases out of ten supply the missing link.

I remember being called upon to give expert advice to a lady and her decorator who had been unable to find a suitable color for a painted dado in the hall and staircase. The upper walls were papered in rich two-colored crimson, the carpet was an Oriental design, the ground deep blue, with large red and yellow ornaments; the wood trim dark golden oak. The lady wanted some light color on the dado; the decorator had tried a lot of colors without satisfaction, and when I got there he had the dado painted pale pea green. The effect was startling and absurd. The proposition was not a difficult one to anyone who had studied color harmony. You had the red paper and blue carpet, so all that was wanted to make complete harmony was a yellow dado. I advised the decorator to paint the dado just plain ocher and stencil a simple border design, top and bottom, in blues and reds, the final effect being very satisfactory.

Some colors never look well on large wall spaces. Blue is not a good color to use in large quantities unless you get a transparent effect by glazing over a light ground, and even then the effect is depressing to my mind.

You will say, "What about the blue sky?" and I will answer, "The blue sky is transparent, ethereal, and clear, and has a depth and purity of color that no pigments ever made and no artist ever born can reproduce."

Red on walls makes a room look smaller and absorbs light.

Yellows give light and airiness to any room and reflect light.

Useful colors in large quantities for churches, public halls, etc., are:—

Primrose yellow.

Terra cotta (white, burnt sienna, lemon chrome).

All tints of ocher.

Flesh color (white and burnt sienna).

Pea green, apple green.

Grey green (white, paris green and touch of black).

Ivory shades (white, lemon chrome or ocher).

Old rose (white, ocher, Venetian red or pure Indian red and black).

Nile blue and Nile green (white, Prussian blue, lemon chrome).

Light citrine, light olive, light russet.

For ceilings the best tints are the creams and ivory tints and greys.

Creams and ivory tints are made from white tinted with one or more of these colors, lemon chrome, orange chrome, ocher, raw sienna; and to produce a warmer tone the addition of a small quantity of burnt sienna, vermillion or Venetian red. To produce a colder tone use a little green, black, raw umber or blue.

Greys are made from white tinted with either black, black and green, blue and umber, black and red, red and blue, burnt sienna and blue.

Light colors are always to be used for ceilings in preference to darker colors. In my opinion a contrasting color is better for a ceiling than a lighter tint of the wall color.

Even in outside painting a knowledge of color harmony is useful to you. For instance, if you want to find a good color for the trim, in contrast to any primary color, use the other two primaries together, thus: Principal color used, red; trim, green (blue and yellow). Principal color, yellow; trim, purple (red and blue), and so on, remembering that black and white and shades of gold color can be used for trim to any color.

I may say in conclusion that it is no use trying to mix good clear tints with so-called cheap materials. You can't do it. Only the best materials should be used. You will find them also the cheapest in the end.

It is a good plan to procure a few tubes of artists' colors (put up in England, if possible to get them) to keep by as a standard to compare with the colors you are buying.—A. V. Wiggins, Toronto, in *Painters' Magazine*.

Calgary financiers are about to construct a factory for the manufacture of heating and ventilating apparatus, plumbers', steamfitters', and tinsmiths' supplies, stoves and ranges, all classes of corrugated iron, and metal ceiling supplies, from, and including, Winnipeg to the coast.

The stock, machinery and fixtures of the Western Foundry and Metal Company, in East Calgary, are estimated to be worth over a quarter of a million dollars. The directors are as follows: Mr. P. S. Woodhall, president; Mr. W. H. McClews, vice-president; Mr. Alex. McWilliams, secretary and treasurer.

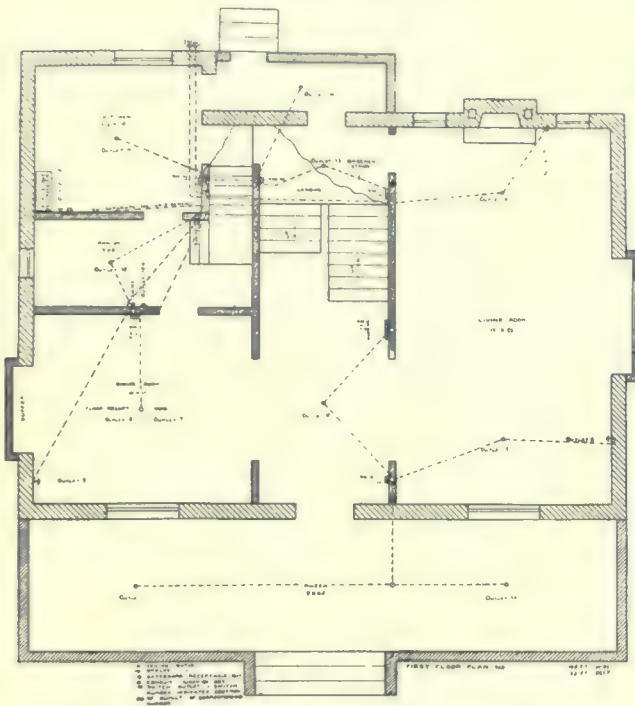
Specifying Electric Wiring

Some Points to be Observed to Enable the Owner to Take Full and Convenient Advantage of the Advancement in Electricity.

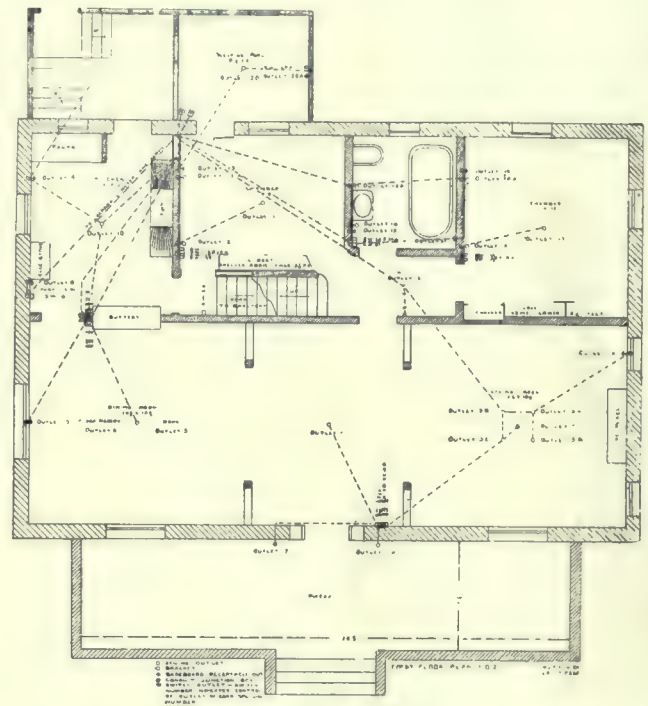
When a house is being wired is the time to put in the little extras, which then cost but an insignificant amount, and later, when the house is to be used, mean untold comforts and convenience. An extra switch here and there, a floor plug stowed away near the bed, where in case of sickness, the heating pad, reading lamp or electric fan for use on torrid summer nights can be cut in with no trouble or cords running

points of electricity slowly began to drive it from that field. Recently, however, due to the large developments of water power, and the advances in the engineering field, the price for electric service has been materially reduced, so that even in the chosen field of gas, namely, that of cooking, electricity is making rapid ingress.

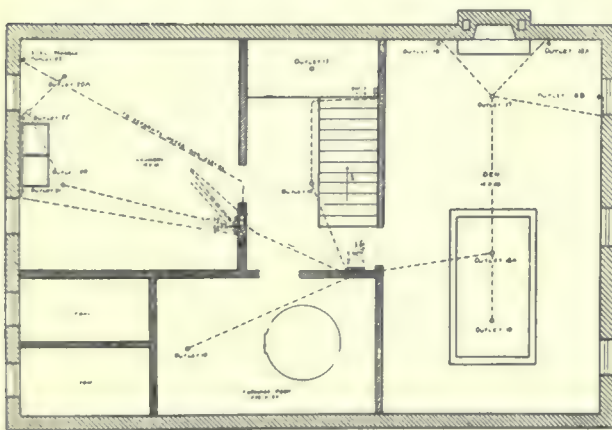
The flat iron, chafing dish, toaster, egg cooker, etc.,



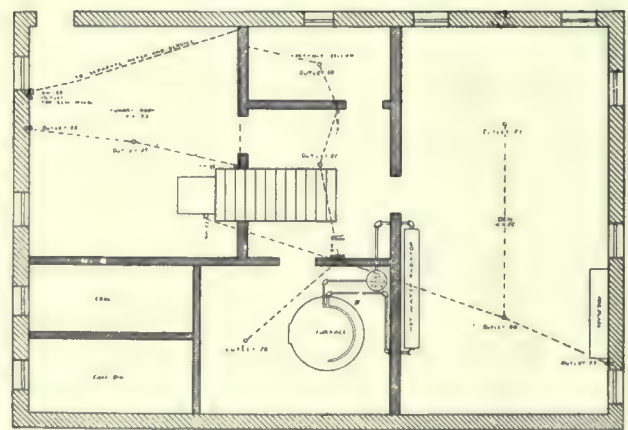
Ground Floor of Residence.



Ground Floor of Bungalow.



Basement Plan of Residence.



Basement Plan of Bungalow.

across from a chandelier light fixture, means a finishing touch for every new modern home.

During the past ten years, the only necessities in life which have decreased in price have been gas and electricity. For a long time gas decreased faster in price than did its rival, with the result that in the cooking field it became almost supreme; lately, in spite of the difference in price the superior

electric fan, all standard household appliances, are available in the electrically wired house. The average householder is unaware of the possibilities of the wired house, and usually only thinks of this matter in connection with lighting. Later he realizes that more thought would have meant having more conveniences, and much saving in cost, but then, the alterations become expensive and the matter is given up.

Many of the wiring contractors also have not given this matter the consideration which it merits, owing to the previous high prices for electric service having rendered the matter only available to those plentifully supplied with the world's goods. Now, however, under the recent reductions there is no reason why everyone building a house, however, large or small, should not avail themselves of the possibilities of electric comforts.

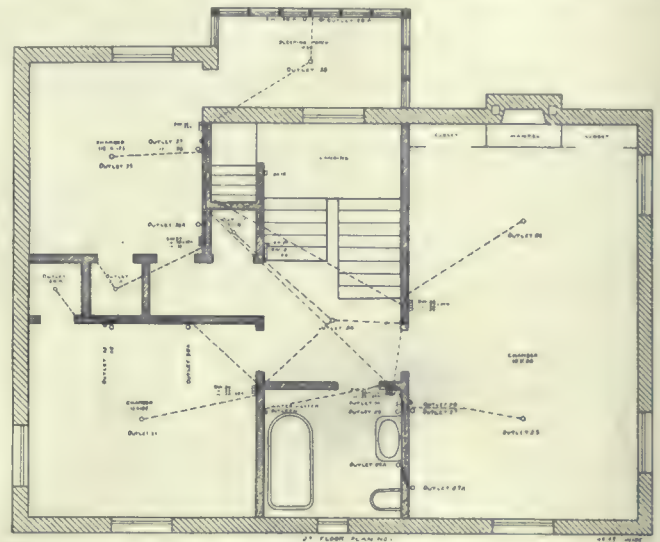
A universal specification which can be used for all classes of electrical equipments, is a subject that has been before the architects throughout the entire country and has never been solved. The Western Association of Electrical Inspectors appointed a committee to prepare specifications, one which could be adopted for all classes of dwellings, one for store and office buildings, and another for factories, but when submitted to the association it was decided that although great care and considerable thought had evidently been given the matter, the specifications did not meet the requirements, and it was finally decided impossible to construct a universal specification. Inasmuch as the Western Association, composed of men of ability in electrical engineering, have come to the above conclusion, I am inclined to believe that the most advisable method for you to adopt in making specifications would be to state the number and location of lights; the kind and location of switches, the location of cutouts, the place where the service is to enter, where the meter or meters are to be located, and the kind of wiring, whether knob and tube, rigid or flexible steel conduit or moulding. State that the wiring must be neat and in a workmanlike manner and in conformity with the rules of the Board of Fire Underwriters. It would also be well to add that before the first installment is paid a letter of approval must be secured by the contractor from the Board of Fire Underwriters.

I have observed in many specifications obsolete and irrelevant terms indicating that a general specification such as those published in book form had been selected and filled in to suit the installation that it was intended to cover. As a consequence the specifications were lengthy, contradictory and misleading. It is this embarrassment, I am informed, that the architects are endeavoring to avoid, and consequently I suggest that the specifications be brief, explicit and free from any statement as to how the equipment should be installed excepting that it must be done in a neat and workmanlike manner, etc. By adding that the material and workmanship must meet the approval of the underwriters and conform to their rules in every respect and detail it covers everything that you might mention and saves you considerable time and possible errors. As the Underwriters' rules only take care of the capacity of wires and not the drop in voltage, it would be advisable in large installations that the maximum percentage of drop be specified.

Specifications are important and necessary in connection with electrical construction, yet there are numerous other very vital features which should receive close and careful attention. One is the time when the electrician is permitted to perform his work. Too often has the electrical work been installed at the same time as the plumbing and heating and frequently with the result that the electrical installation, which was possibly first class and worthy of praise, has become extremely menacing, occasionally resulting in a fire, owing to having been disturbed and crossed with pipes and other objects. I would advise that the electrician be prevented from working until all other mechanics are through and the house ready for lathing. Then, after the equipment

has been inspected, you will know positively that it has not been disturbed. I would also advise that the lathers be permitted to work only after you are assured that the equipment has been inspected and accepted. This suggestion, however, refers only to concealed knob and tube construction, as rigid steel and flexible steel conduits are not subject to the same misuse.

The Underwriters' rules permit 660 watts, or twelve candle power lamps, to a circuit which the electrician takes advantage of. Frequently after the equipment is completed it is decided when fixtures are being purchased that more lights are desired in some of the rooms than originally intended and consequently the circuits become overloaded. To avoid this, it might be well to specify eight lamps to the circuit as is being done in other towns, and then there will be ample capacity to add more lamps, fans, curling irons, etc. To facilitate the work of the electrician and avoid errors



Second Floor Plan of Residence.

and disputes it would be well to furnish him a blue print upon which the location of the fixtures and switches and various devices should be designated. The symbols most favored and most prominently used in designating the kind and location of switches, brackets and fixtures and the number of lights on each are those adopted by the National Contractors' Association, which, I believe, will be pleased to furnish them on request.

With the advance of electricity for domestic purposes, the architect and builder finds that they have new problems to solve and an ever increasing responsibility.

Attached are found cuts showing two model houses, one of the bungalow type, costing \$3,000 complete, the other 2-storey and basement, costing \$8,000 complete. Each house is designed to use electricity for all purposes. The necessary circuits are indicated on each print of the plans, the cut-out boxes, floor receptacles, baseboard receptacles, also ceiling outlets, outlets for electric stoves, refrigerating plant, etc., are noted. Each house is arranged with a suitable number of three-way switches, so that certain lights may be operated from different portions of the building. In designing the houses, it is our purpose to show some of the many uses for electricity in the modern residence and endeavor to impress upon the mind that the cost of arranging for electric appliances is very little more than that occasioned by the wiring of the average residence when the rules of the city electrician are strictly adhered to.

In both of the residences a special circuit with special meter is arranged, that special or power rates may be granted for the electric stove, electric laundry machinery and electric grates if desired. All of the remaining outlets, baseboard receptacles, etc., are connected to the three-way, 110-200-volt switch, and are designed to operate upon the regular lighting rates established for residences. In discussing the possibilities we will divide them into various rooms.

Living Room:—Electric radiator, foot warmer, tea pot, reading lamp, decorative lighting, electric piano, fan, electric thermostat for this and all rooms, so arranged as to govern the temperature of the house.

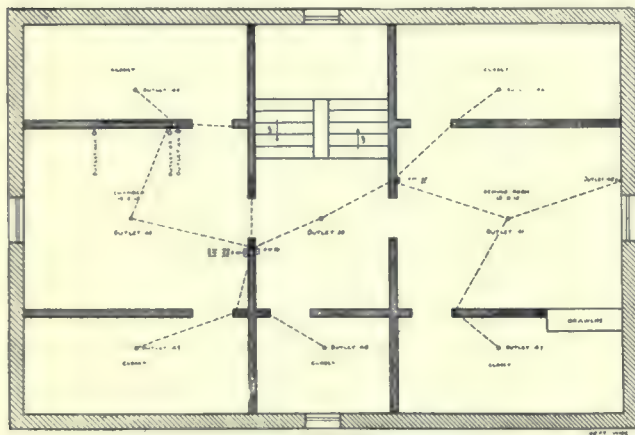
Dining Room:—Chafing dish, coffee percolator, decorative lighting, egg cooker, waffle iron, toaster, centrepiece for table, oyster cooker and stewer.

Servant's Pantry:—Electric plate warmer.

Kitchen:—Complete electric range such as manufactured by various representative firms and consisting of:—Electric broiler, hot plates, milk sterilizer, electric cookers, water heater. On the rear porch, one of the small automatic Refrigerators, the motor for operating same being connected to the circuit used for the electric stove.

Hall:—electric heater, electrically illuminated statuary, control system for the exhaust fan used in connection with hot-air heating plants.

Chambers:—These are arranged for the use of various



Third Floor Plan of Residence.

appliances such as:—Curling iron, comb, heating pad, reading lamp, fans.

Den:—Sealing wax heater, envelope sealer, cigar lighter, heater, appliance for chalking cues, decorative lighting.

Bath Room:—Instantaneous water heater, shaving mirror.

Sewing Room:—Sewing machine, electric iron, small steam generating plant for steam pressing.

Laundry:—Washing machine, mangle.

The basement is also provided with an electric ice cream freezer.

All the closet doors are to be so arranged that the closet will be illuminated upon the opening of the door, and the closing of the door will operate as a switch, putting the lights out.

A flexolite may be used in any part of the house where there are dark corners, when additional light is desired.

Both these houses are equipped with compressed air vacuum cleaning plants.

The exterior of these houses, both front and rear, is provided with porch lights burning all night, and the numbers used to designate the location have miniature incandescent

lamps, so that the stranger may be guided during the hours of darkness.

Both houses are also equipped with motor-operated house pumps.

Garage:—Mercury arc rectifier, water heating device, motor operated air pump, porch light for all-night use.

The Bungalow requires, approximately:—

80ft. — $1\frac{1}{2}$ inch conduit
138 " — $\frac{3}{4}$ " "
291 " — $\frac{5}{8}$ " "
18 " — No. 4 wire
245 " — No. 8 "
1145 " — No. 14 "
42 junction boxes
98 outlet boxes.

The larger house will require:—

85 ft. — $1\frac{1}{4}$ inch conduit
60 " — 1 " "
320 " — $\frac{3}{4}$ " "
750 " — $\frac{5}{8}$ " "
80 " — No. 4 wire
170 " — No. 8 "
2800 " — No. 14 "
38 junction boxes
48 cut-out boxes.

The wiring of both houses is designed in accordance with the rules and regulations of the Underwriters' Association, also those of the City Electrician, and are approved by both. In this, as in several other large cities, one circuit is allowed in a conduit, which, in a way, accounts for the large amount of conduits used in the wiring of both houses.

Lighting.

The lighting of the houses is a feature and can be done with a combination of indirect and artistic effects such as are secured by the use of ornamental art glass fixtures for the living room, dining room, den and hallways, and indirect lighting for the chambers.

All bells in these houses are to be connected with a small transformer designed to operate upon the lighting circuit.

Where desired, a small electric lift for packages, etc., may be installed, and also an electrically operated burglar alarm system.

Using Sand Wet and Dry

During a discussion at the N. A. C. U. convention in New York of the necessity for storing sand to become dry before using, to insure uniform mixing, C. M. Powell, who read a valuable paper on concrete tile plants, said some tests he had made showed that a cubic foot of damp sand weighed 87 pounds and a cubic foot of dry sand 106 pounds—this as illustrating the great difference in the amount of sand in a batch when used wet and when used dry. The sand particles covered by a film of moisture pushed each other far enough apart so that a cubic foot weighed 19 pounds less than when dry and they packed together closely.

Specifications for Scrubbing a Concrete Surface

Written by Henry H. Quimby, and Adopted at the Last N.A.C.U. Convention in New York City in December.

For all surfaces of concrete that are to be exposed to view, the face forms shall be straight, smooth, evenly matched, and watertight, and so framed and fastened together at corners and angles with screws or clamps as to be detachable and removable without the necessity of jarring or of prying against the concrete. Any offsets that may appear at joints shall be dressed off flush, and any openings at joints or corners, or any knotholes or other voids, shall be plugged flush with some stiff, plastic substance, such as clay mixed with plaster of paris or sand. Before placing the concrete the whole surface of the face form shall be coated with petroleum or other water repellant to prevent adhesive of the concrete.

The concrete shall be thoroughly mixed, be wet enough to flush, and be spaded against the face form to the point of being completely flushed against the form, i. e., until the cement soup or grout follows and envelops the spade. Then the spade is to be used to ram the concrete near the face so as to push the aggregate of the concrete forward to the face, care being taken to obtain a uniform mix and texture at the face.

The work of placing concrete shall be continuous throughout definite stages so that joints between different days' work shall be at some feature line, or be made truly straight and level.

On the day after placing concrete, or later, as will be determined according to the temperature of the weather and the setting quality of the cement used, while the concrete is friable or pulverable, the forms shall be carefully removed and the concrete surface immediately scrubbed until the surface film is removed and the aggregate is exposed to a uniform degree, and then rinsed off with water and kept moist for several days. If any void spaces appear, or if spalls are broken off, the defects shall be patched with similar mix immediately after the scrubbing, using the hand or a wooden float—not a steel trowel—for applying and smoothing the patches. After they are sufficiently set—say within from five to twenty-four hours—all patches must be scrubbed to the same texture as the general surface and be rinsed clean and kept moist for several days.

Use Fibre Brushes.

If a granolithic surface is specified, it shall be made by placing against the face forms in advance of the body concrete a fine granolithic or facing concrete composed of 1 part Portland cement, 1½ parts sand, and 2½ parts pebbles or crushed granite or other approved stone as may be selected, screened to pass ½ inch and be retained on ¼ inch screen, thoroughly mixed and soft enough for full flushing. This granolithic must be maintained between the body concrete and the face form in a thickness of about 1 inch, care being taken that the body concrete is rammed into and perfectly united with it. If iron or wooden mold boards are used to retain the granolithic against the face while placing the body concrete, care must be taken that the board is not permitted to remain until initial set takes place, but be frequently jarred and raised slightly at short intervals to prevent the formation of shuts and seams and air spaces between granolithic and concrete.

For scrubbing the surface ordinary fibre brushes with

a light stream of water from hose or can will be sufficient if the set is not too hard. If set is harder, wire brushes followed by fibre brushes and rinsing, may be used.

If for any reason a portion of the face form can not be or fails to be removed before the concrete has become too hard for removing the surface film by scrubbing, the hard face shall be treated by sand-blasting or tool-dressing. It shall be cleansed after tooling by washing it with a 1 to 10 solution of muriatic acid and water, then thoroughly rinsed with water to remove all traces of the acid.

In scrubbing, or sand-blasting, or tool-dressing, care must always be taken to avoid roughening or blunting corners of the work and to maintain all edges sharp.

Coloring Concrete Work.

The following materials for colored concrete work have been recommended by an authority. The quantities given are per barrel of cement, mixed dry with the cement and sand. The sand must be thoroughly dry. In mixing, the colors should be made deeper than the required tint, as drying results in bleaching. Venetian red and common lampblack should not be used, as they are liable to run and fade. The schedule for colors is as follows:

For brown, 22.5 lbs. of best roasted iron oxide; or, 13.5 to 18 lbs. of brown ochre.

For black, 40.5 lbs. of manganese dioxide.

For blue, 17 lbs. of ultramarine.

For buff, 13.5 lbs. of ochre. (This is likely to considerably reduce the strength of the mixture.)

For green, 21.2 lbs. of greenish blue ultramarine.

For grey, 2 lbs. of bone black.

For red, 20 lbs. of raw iron oxide.

For bright red, 20 lbs. of Pompeian or bright English red.

For purple, 18 lbs. of Prince's metallic.

For violet, 20 lbs. of violet iron oxide.

For yellow, 20 lbs. of ochre.

Concrete Fence Posts.

During the past year a committee of the American Railway Engineering and Maintenance of Way Association has studied the use of concrete for fence posts, and the indications of the study are that they are practicable, durable and economical. In the report to the annual convention it is stated that the 8-ft. post is most desirable. Those with a cross section approaching a square form are easiest made and most suitable for fencing. The spacing should be the same as for wood posts.

The investigations indicate that the stone or gravel used in the concrete for these posts should pass a ½-in. sq. mesh and that the concrete should be mixed wet, in a batch mixer, and poured into the molds. It is observed that the poured posts are a little over 25 per cent. stronger than tamped posts of the same size, mixture and reinforcement, and that they are also better able to withstand the action of frost and alkali. For best results posts are allowed to remain in the yard undisturbed for at least 60 days after coming from the molds. Breakage is to be expected in handling and transportation is not in excess of 0.3 per cent.

The Steel Square as an Aid to Roof Framing

How to Mark Splay Cuts by Means of the Steel Square.

The difficulty about most books on roof framing is their lack of continuity, the jumping of rather important steps in reasoning, which tends to confuse the beginner. In this series we shall follow a definite course of lessons, beginning at first principles, and leading up, step by step, to the more difficult problems. These lessons have been developed by a practical workman, who has taken up the work of teaching it. The explanations are in most cases simple and easily understood. The beginner should learn much. The more expert will undoubtedly find something new. All will at least find the "why" of the operations, besides the "how." After this series is complete we shall take up stair building. Criticism is always invited.—The Editor.

The chief object in this article is to draw attention to the fact that all splay or side cuts are obtained by similar methods, comparatively speaking.

We should overcome the idea that there is a separate method for each kind of rafter.

Probably before going further with the subject it will be well to explain just what is meant by splay cuts.

Splay cuts are those which give the rafter or other piece of wood a cut which can be seen from the side, as those exposed in figs. 7 and 8, or that which is marked on the top of the rafter according to bevel, fig. 1, at E.

There are not many in the trade who realize the general

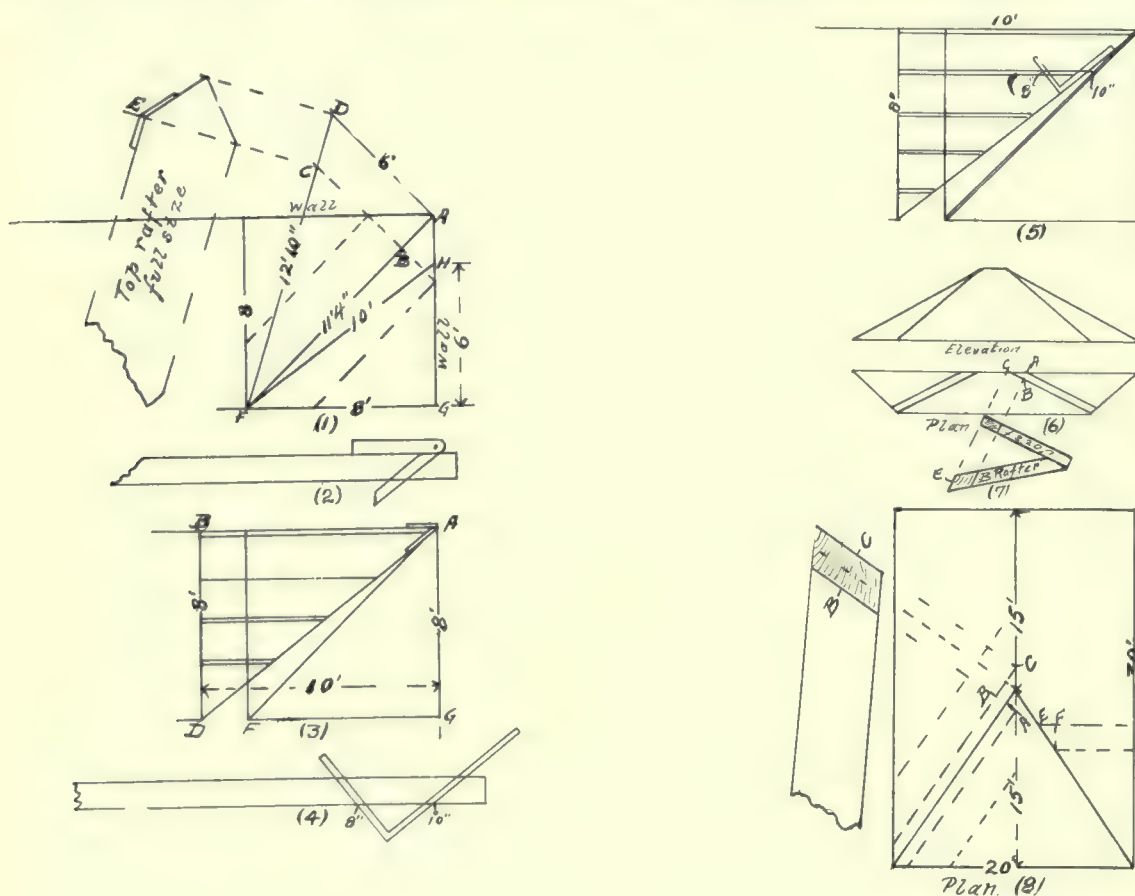
To designate these three methods let us name them: first the drawing method; second, the plan method; and third, the steel square method.

In this order let us consider them.

To those who have taken up drawing the first will be quite familiar, as it only remains to adopt it to the various cases upon which the carpenter is engaged and he will readily obtain the required angles.

For example a small building is being erected in a corner, the plan dimensions being 8 ft. x 8 ft. and the rise 6 ft.

The roof is hipped from the external to the internal corner and as we see the run of this hip is 11 ft. 4 in.



principles that are employed in obtaining splay cuts and how nearly allied these principles are, and how they apply in a universal system not alone to hip roofs, not alone to valley roofs, but also to these principles apply to roof work and to all work where splay cuts are required.

Now there are three practical and well proved methods which are universally practised and without which any work involving splay cuts would be very difficult to perform.

By erecting a vertical line at one end of this, 6 ft. high we are in a position to draw the line representing the hip which will be 12 ft. 10 in.

The dotted lines in the plan represent the sides of the hip in detail, therefore, to obtain the splay cut, transfer the distance A B up to the hip line C D, which will be the length of the splay, this enables us to draw a view of the top of the hip and set the bevel to the angle shown at E,

which angle can be taken from the drawing and applied to the scantling.

As we require the length of the common rafter, we may draw an elevation of it on the line F G., which is the run length.

For this purpose measure 6 ft. up the line G A and mark the point, H.

Join F and H which will be the length of the common rafter in this case. 10 ft.

Now for the splay of the jacks, it will avoid complication to make another drawing of the plan as shown in fig. 3.

The triangle to be filled in with jacks has for one side the length of the common rafter, which we will stretch out on the line A B, fig. 3.

At right angles to A B draw A D equal to A G.

Join A and D, which will be the length of the hip.

The bevel can be set to the angle B A D at A to apply to the scantling, as in fig. 2. This method can be applied to any roof when the rise and run are known.

In irregular pitched roofs the distance B D, fig. 3, would not be the same as FG, therefore there would have to be a stretchout for each side.

The second of these methods, which is known as the plan method, is very applicable in many cases without the aid of drawing.

This method consists of finding out what the splay measures horizontally, or in other words how much it differs from a square cut on the level and then recede this amount square from the plumb line.

To illustrate this, take the plan of a bay which has joists perpendicularly under the hip rafters as shown in the plan (fig. 6).

It is an easy matter to find the angle at which the joists fit the wall.

Then find out how much shorter the short side is than the long side.

To do this mark the scantling square across from the short side as shown at A B the length of the splay cut is from B to C.

Now look at sectional elevation fig. 7 and compare the splay on the joist and the splay on the rafter.

They are identically the same, when taken horizontally.

One particular regarding this method must be remembered, that this angle at the point C, fig. 6, is not the angle for the top of the hip. So many men have to try this angle and be disappointed before they can see it.

The real way to lay this out is to first lay out the point as a common rafter square across the plumbline on each side.

Then measure back the amount C B horizontally and mark the plumb line B. Cut from B to C.

This example is shown as treating one individual rafter of a size that is easily handled as no great responsibility is involved in cutting such a small roof.

But the same method is equally reliable for large work and is made use of in countless different positions beside roof work.

For example, a roof is hipped at one end the building being 30 ft. long by 20 ft. wide, the sides are half pitch, which means that the rise is 10 ft.

The end has a different slope, which will be understood by the end of the ridge being 15 ft. from the end of the building.

In this case draw the rafter full size as shown by the dotted lines on the plan.

Again square across from A to B, which shows that the amount to recede is the distance from C to B. This

also is the amount to recede for the end jacks. The amount to recede for the side jacks is shown from E to F.

The methods described may not seem to be very well in place in an article on the steel square, but let these be understood and it will be seen that all three methods have a strong geometrical relationship.

As a rule, in learning, it is not well to attempt too much at once, and therefore let me state one fact which alludes to all splay cuts by means of the steel square; which is this:

Always look for the right angle triangle and use its two sides.

That is the rule, the one rule, and the only rule and there is nothing important outside that rule in the whole of steel square practice. Though the square may be used as a bevel to lift an angle from a certain place and lay it on the scantling and the other trivial uses may be made of it, yet its real value lies in its one feature, the triangle.

In the case stated in fig. 3, it is easy to see the right angled triangle which is to be filled in with jacks has sides 8 ft. and 10 ft.

To make this example more clear it will require a drawing to show the steel square method.

There is one thing which is always misleading and bewilders many a clear sighted mechanic.

This feature can be seen in fig. 7 where the square is applied to the rafter in the roof.

The square is turned over as it were, at least the right angle contained in the square is turned the opposite way to what lies in the roof.

So in all even pitched work the splay cut is marked by using the length of the common rafter and its run on the square.

In all unequal pitched work the length of the two sides of the triangle to be filled in with jacks must be used.

Some developments in the labor disputes would be amusing if they had not such a serious effect on the building operations. Surely the builders have trouble enough dealing directly with the various unions without being made to suffer in the disputes between the various trades. An instance in Chicago during February illustrates the point very nicely.

Because their bosses would not let them do the work for which they were paid, sheet metal workers on the new Columbia theatre have struck and the electrical workers and plumbers have quit in sympathy. The trouble hinges upon the sheet metal doors in the building. The carpenters said that since time immemorial it has been the job of a carpenter to hang doors. The metal workers said that in as much as doors are of steel, the hanging of them is their own work. The employer offered to let the metal workers watch the carpenters put in the doors, paying them sixty cents an hour for not working. The offer was indignantly rejected. A like proposition met with a similar reception from the carpenters. In desperation the builder ordered the work stopped. The metal workers then struck. Without any remarks on the rights of either union, could not this have been settled by arbitration?

The storage of food in a house becomes increasingly important as we realize dangers of the common house-fly, those carriers of filth and disease, and we can not regard any house as hygienically complete unless sensible provision be made for food storage.

Some Notes on House Drainage

A Continuation of Articles on Building By-Laws and Sanitary Dwellings.

Some months ago, we printed an article on Building By-Laws and Sanitary Dwellings, by T. Robinson. Mr. Robinson outlined the conditions prevailing in England regarding this important phase of building. In this article he takes up the very important question of drainage, with particular reference to his own country.

"The by-laws as to house drainage in the various districts throughout the country are by no means uniform; they vary a great deal, but not more than the general practice. It should not in these days be necessary to point out the desirability of having a separate connection to the sewer for each house. This can be done without exception if the Local Authority so decide. The idiotic state of the law on 'drain' and 'sewer' makes this essential in the public interest, although in some districts a combined drain is allowed under an agreement absolving the Council from liability. But the separate drain is the correct thing and should be insisted upon. A very important item in house drainage is omitted from the by-laws in many districts, viz.: the inspection chamber. This is provided for in the Local Government Board's Model Series, and ought to be uniformly adopted.

"The very controversial question of the intercepting trap must here be referred to briefly. I am of opinion that there is a real danger of having too many traps on the house drainage system. According to the Model By-Laws of the Local Government Board, each house drain must have an intercepting trap, and all the other connections must be trapped, including bath and lavatory waste pipes. This means that all the dirty water, generally containing much grease or fat, from the bath or scullery sink, etc., must pass through three traps before reaching the sewer, viz.: waste pipe trap, gully trap, and intercepting trap. Having regard to the first principle underlying the water-carriage system—that of prompt and unimpeded removal of all sewage matter, I think one may with some justification question the real value of this triple obstruction to the flow of sewage, and in suggesting any modification of this point I would begin with the six-inch intercepting trap. Whether any intercepting trap is required at all, depends upon purely local conditions. I can easily imagine a district having a modern system of sewers, laid at self-cleansing gradients, and constructed throughout in such a manner as to reduce the formation of sewer gas to an absolute minimum, where the primary object of interception need not be considered, sewer gas being non-existent. I am associating a rapid flow of sewage, an absence of obstruction and accumulation with a plenitude of ventilation. Given these conditions, then I think the intercepting trap can be safely abolished, taking care, of course, that the house drains themselves are sound, efficient and well ventilated.

"If the Local Authority permit the existence of foul and insanitary sewers then sewer gas will be abundant, and must be guarded against. In such cases I suggest that a four-inch interceptor will be preferable to a six-inch, and I would here put in a word in favor of the four-inch drain. For any house under £80 rental a four-inch drain is quite sufficient, having a discharging capacity, when laid at a gradient of 1 in 30, of 175 gallons per minute, when running full. My further observations on house drainage may briefly

be summarized thus: Gradient (ideal), 1 in 30; size, 4 inch; inspection chamber inside curtilage; inspection chamber, minimum size, 3 feet by 2 feet 6 inches; brought to surface; drain laid on concrete; drain tested with water test; Stanford joints to be used in water-logged ground; plain joints to be made with Portland cement; gullies provided with channel tops and waste pipes to discharge therein at least 1 foot distant; drains under buildings (except outbuildings such as coal place, etc.) not allowed; drain ventilator or soil pipe ventilator to be of 3-16 metal, with caulked lead joints, to terminate 4 feet above eaves and 8 feet away from any window. I am inclined to think that if these points are honestly observed we might with advantage allow scullery sink waste pipe to be untrapped.

"As regards water closets, we insist upon and secure: (1) Approved wash-down type basin; (2) window, 2 feet by 1 foot; (3) air brick or louvre for ventilation, and we treat outside water closets on these points like those inside. Ash pits for new houses are out of date. We have not had a new ashpit built in my district for 12 years. (We have, by the way, abolished over 800 old ones.)

"Sanitary dust bins of about 3 cubic feet capacity, and emptied once or twice a week, are a great improvement on any form of fixed ashpit, and should be insisted upon generally. There are many points in connection with house construction which I have purposely omitted, but I think if the foregoing details were to receive that close personal supervision which their importance demands, we should have a reasonable chance of securing healthy conditions in and around our houses, which would tend towards the realization of a higher standard of public health.

"It may be suggested that some of these things are impossible on economic grounds, but I refuse to believe that the richest country in the world is too poor to afford healthy habitations for her people. We have ample wealth; we have ample producing power. What we need, amongst other things is a wiser expenditure of national wealth, and I am old-fashioned enough to believe that the provision of clean, healthy and happy homes is one of the first duties of every community which desires to maintain or to establish a high standard of citizenship."

Women and Public Health.

The important part that women can take in the measures for improving public health, and especially in the reduction of infantile mortality, has been for many years recognized in the appointment of women sanitary inspectors, and in the last few years by the appointment of health visitors and school nurses. The Local Government Officer, England, points out that the appointment of these officers is already authorized in London, and a bill is now before Parliament to authorize their appointment throughout the country. In order to carry out these duties efficiently special training is required, and many institutions throughout the country have included this work in their curriculum. In London the Royal Sanitary Institute and the National Health Society have been giving systematic training for several years, followed by examinations, and the certificates given by these two societies are specified in the Statutory Rules and Orders issued by the Local Government Board among the qualifications necessary for a health visitor in London.

THE BUILDER AND CONTRACTOR

Published on the 15th of every month by

The ACTON PUBLISHING CO. LIMITED

In the interests of the Builder, Contractor, Architect and Building Trades

MANAGING EDITOR - K. A. MACKENZIE, B. A. Sc.

Present Terms of Subscription, payable in advance:

CANADA and GREAT BRITAIN	\$1.50
UNITED STATES and other countries	2.00

Advertisement Rates on Application.

HEAD OFFICE	59-61 JOHN STREET, TORONTO
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EDITORIAL OFFICE	43 VICTORIA STREET, TORONTO
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MONTREAL OFFICE	ROOM 13 CORISTINE BLDG.
	Telephone M. 7106.
CHICAGO, ILL.	4075 PERRY STREET
LONDON, ENG.	A. H. CLAPP, BYRON HOUSE, FLEET STREET

Address all business communications to the Company. Everything affecting Editorial Department to the Editor.

Notice to Advertisers

Changes of advertisements should reach Head Office two weeks before date of publication.

VOL. I. TORONTO, CANADA, JULY 15, 1911 No. 6

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Editorial Notes

At a recent meeting of the Alumni Association of the Engineering Faculty of Toronto University it was announced that all the necessary details had been arranged to found two research fellowships for graduate students. The idea is to provide funds to enable graduates who have been out in practical work for some time, and who have, therefore, the requisite experience, to efficiently co-relate theory and practice, to return to the university and pursue an investigation into some problem, the solution of which would be of general practical value.

That the effect of this new move will be far-reaching goes without saying. Any project that brings the every-day practical man into closer touch with university life, and vice versa, cannot be too highly commended. The research fellowship idea as a means of bringing this about has been gradually gaining ground everywhere, and as a result manufacturers are beginning to found fellowships in order to have their particular difficulties solved. But the true principle must not be lost sight of. It is not the mere solving of some one problem that is aimed at. It is rather the training received by the candidate that is of real value, not only to himself, but to all with whom he may subsequently be connected. That these fellowships will be associated with a faculty under the leadership of Dr. J. Gilbraith is of extreme importance. The Dean of the Engineering Faculty of Toronto University has always stood for all that serves to unite scientific training and practical life, and in consequence there is every reason to believe that this new idea will develop to its deserved fulness.

The ordinary man does not always grasp the direct connection between theory and practice.

It has been stated that the science of engineering is underlaid by a comparatively compact body of scientific principles, which assertion will be interpreted as meaning that the apparently independent and unrelated facts in constructive theory are capable of reduction to a relatively small number of generalizations. These generalizations are the fundamentals to which the above heading refers, and a little reflection will show the advantage of mastering them rather than endeavoring to store away an endless mass of data having no known unity or inter-relation. The whole is greater than the part includes, and is equal to the sum of its parts. Principles are wider than instances. The former are generic; the latter specific. A few illustrations will assist in making this clear.

If the officials of a progressive and well known American city had recognized that the illuminating power of a light-giving body varies inversely as the square of its distance from the illuminated plane, the subsequently abandoned method of erecting street lamps on towers two hundred feet above the pavement would never have been attempted.

From the single principle that for specified stresses in a known material the deflection of beams similarly loaded varies directly as the span and inversely as the half-depth, the deflections of all beams of whatever dimensions may be computed when that of a known beam has been determined. For instance, if the deflection of a yellow pine beam 6" x 8" x 10', fully stressed under a uniform load, be symbolized by d , the deflection of a 10" x 16" x 20' beam, similarly

loaded and stressed to the same intensity, will be

$$\left(\frac{20^2 \times 4}{10^2 \times 8}\right)d = 2d$$

An analogous principle is the one which asserts that the strength of beams of the same material is directly proportional to the square of the depth and to the width. From this fact it is observed at once that if floor joists of given span be doubled in depth, while the width remains constant, the strength is increased fourfold, while if the width be doubled keeping the depth the same, the sustaining power is only twice what it was at first. So, too, from the additional fact that their strength varies inversely as the length, the supporting power of all beams for an assumed method of loading may be calculated regardless of dimensions, when that of a given beam has been determined. If the safe load of a 6" x 8" x 15' beam, centrally loaded by W, then that of a beam of similar material 12" x 16" x 30' would be

$$\left\{\frac{15}{30} \times \left(\frac{16}{8}\right)^2 \times \frac{12}{6}\right\} w = 4w.$$

The spouting velocity of water is known to vary as the square root of the head and since turbines for maximum efficiency vary their speed with that of the theoretic velocity of the reacting water, it follows that if the head of water on a given turbine be increased fourfold, the speed of the turbine must be doubled, and the generator will have to be designed accordingly. It seems a simple assertion that the power of a stream depends solely on the product of the head and the flow, and yet how frequently incorrect notions as to this fundamental are entertained. The horsepower of a certain stream for a given fall may be denoted by P. It is surely a simple matter to understand that the

power of a stream of six times the discharge and of five times of the fall will therefore be denoted by 30P.

The kinetic energy of a moving body is proportional to the square of the velocity. Then it follows that if the penetration of a pile struck by a hammer moving at a known speed be one inch, let us say, the penetration, when the speed is doubled will be 4", other conditions being the same.

For the same internal pressure and material the thickness of water mains must vary as the diameter, so that a 36" main should have twice the thickness of shell required for an 18" pipe, other things being equal.

The power-transmitting capacity of line shafts of given material is proportional to the cube of the diameter and the speed, and hence, if the capacity of a shaft of diameter 2" and of speed 75 R. P. M. be denoted by P, that of a 3" shaft revolving at 150 R. P. M. will be

$$\left(\frac{3^3 \times 150}{2^3 \times 75}\right)P = 6\frac{3}{4}P$$

To design a bridge with a centre span at mid-stream is admittedly one of the axioms of bridge aesthetics, and yet how often is this simple rule transgressed by the construction of an even instead of an odd number of spans? How often, too, has the principle of the thrust of the arch been similarly ignored? It has times without number been erected on an unstable foundation or on vertical piles in a yielding soil only to subsequently develop cracks resulting in the marring of the appearance and the weakness of the structure.

The cases above cited are only examples. The number might be extended almost indefinitely, but the truth would be thereby scarcely more strongly emphasized. If principles are properly grasped, individual instances may be largely ignored. The ability to understand and apply these is one of the ear-marks of the trained constructor.

The Financial Side of Co-operative Garden Cities

Originating with Philanthropists, the Idea Has Been Developed by Keen, Far-Sighted Business Men.

We have given considerable space to the descriptions of Garden Cities in the Old World. In view of the fact that various schemes are under way in several Canadian cities, the financing of those in England is most timely. We give below an analysis by an English financial paper, *The Economist*.

One of the most interesting developments of the twentieth century has been the growth of the garden city movement. Originating with philanthropists and æsthetic millionaires the idea has been developed by far-sighted and humane employers, and town planning has now been entrusted to municipalities as a function by the Act of Parliament with which Mr. John Burns is associated. The popularity of Sunlight village and Bournville has given a commercial impetus to garden cities, and this week a prospectus has been issued setting forth a new scheme of town planning which is to be carried out near London, at Ruislip and Northwood.

The estate on which the new town is to be built is the property of King's College, Cambridge, and the Provost and the Fellows of the College are to be congratulated on their public-spirited action in helping to carry out a scheme which will greatly enhance the value of their property, though it may not extract the utmost farthing of profits. This is just what a great and famous foundation should do; for it should be above the degrading tactics of the jerry builder. The college has agreed, subject to the approval of the Board of Agriculture, to grant to the company certain rights of acquisition over the whole of the college estate at Ruislip, consisting of some 1,300 acres. The chief feature of the agreement, it will be seen, is that, if before July 31, 1911, 133 acres of the estate are acquired, the company will be entitled (but not bound) during 21 years from the date of the agreement either to purchase or to take up on building agreement or lease additional lands at prices which will average under £167 an

acre. This arrangement is important, as under it land need not be acquired in advance of the demand at the time and no further land need be taken up if at any time the demand ceases. It should be mentioned, however, that the college is legally unable to grant options, and the agreement could not be enforced at law in the event of the college desiring to repudiate it.

The capital of the company, which is registered under the title of Ruislip Manor, Limited, amounts to £75,000, and is divided into 75,000 ordinary shares of £1 each, carrying a cumulative dividend of 5 per cent. per annum, free of income-tax, and the right on a winding-up to a return of capital paid up with a bonus of 10 per cent. thereon. The cumulative nature of the dividend in a venture of this sort is important, as obviously no revenue can be earned until the town has reached a certain stage of development, and even then in the early stages the amount derived from ground rents, etc., must be smaller than the expenses of development. Of course, the market for shares of this sort must be very limited. Still, there ought to be plenty of wealthy investors who will gladly subscribe.

"It is thought," adds the prospectus, "that the residents should share the profit accruing from any estate developed through their co-operation. Accordingly, the memorandum of association authorizes the directors, after the payment of the shareholders' dividend and provision of all proper reserve, to devote the surplus from time to time to the purchase, provision, and maintenance of parks, pleasure grounds, open spaces and public buildings."

In view of this new and promising enterprise, it may be useful to trace the financial history of one or two of the garden cities that are already in existence. The oldest and perhaps best known is situated at Letchworth (Herts), and was promoted by the first Garden City Company, Limited. The first prospectus of this company was issued in September, 1903, and the share capital at that time (£58,000) has since been increased to £171,931. The dividend is cumulative, and at the rate of 5 per cent. Letchworth is some 30 miles from London, and the object of the promoters was to make it a separate city and not a residential suburb laid out on systematic lines. To this end the establishment of factories was encouraged, and there are now in existence about two dozen factories of various sizes.

An examination of their report reveals several interesting facts. First, it should be borne in mind that the directors, almost all of whom are well-known persons interested in town planning schemes, and who represent a large part of the share capital at present subscribed, are more likely to have the rapid development of the city at heart than the early payment of dividends. The net loss on revenue account has been brought down to £1,676, after paying all fixed charges, and if progress is continued at the same rate during the next year or so, the arrears of dividend will begin to be paid off. Notice is taken of the variable nature of the net loss. It reached its highest point of £5,576 in 1906, three years after the founding of the city. The next year, 1907—the year of booming trade—it had sunk to £3,333. Then came the lean years of 1908 and 1909, which had a marked effect on the development of Letchworth. The estimated value of new buildings only rose from £314,000 in 1907 to £340,000 in 1908 and £365,300 in 1909, while the net loss on revenue account rose during the same years from £3,333 to £4,651 and £3,693.

The Hampstead Garden Suburb, which was promoted

by the Hampstead Garden Suburb Trust, Limited, has been in existence since 1906. The authorized capital of the company amounts to £75,000 ordinary shares of £1 each, entitled to a 5 per cent. cumulative dividend, of which 42,961 have been issued and paid up. There is as well £108,793 of 4 per cent. debenture stock, and a mortgage debt of £40,000. The net revenue for the year ending March 31, 1910, was £727, arrived at by debiting £911 of the interest on mortgage and bank loan, etc., and debenture stock to revenue, and carrying £9,682, consisting of the balance of interest and general expenses, to capital account.

Previous to last year all the interest on the mortgage debt of £40,000 and on the outstanding debenture stock was debited to revenue account. As practically the whole expenditure of the trust was on development work, which can only fructify slowly, until in the end a rental of at least £375,000 is expected, the board decided, after taking the advice of their auditors and legal advisers, to apportion the interest payable by the trust on the £40,000 mortgage and the debenture stock as between capital and revenue account. The method of apportionment adopted was to ascertain the rent receivable by the trust during each financial year and the total rent which the trust may fairly expect to receive when the property is fully developed, and to apportion as between revenue and capital account the interest on the mortgage and debenture stock in the same proportion. This alteration in the methods of book-keeping allows the sum of £10,708 to be transferred to capital, and gives a balance available for distribution of £1,268, out of which the directors are paying a dividend for the year ending March 31, 1907, on the ordinary shares of 5 per cent. This method of anticipating future earnings appears more ingenious than prudent, for at present the balance-sheet contains unrealizable assets of nearly £30,000, while the amount of cash is only £1,922; sundry debtors, £1,434, the creditors and debenture interest due in April amounting to £4,394.

There are a fair number of other garden cities scattered over England. Round London schemes have been started at Romford, Beckenham and Esher, but these are yet in their infancy. The Co-partnership Tenants, Limited, which is under the able management of Mr. Henry Vivian, has no less than 14 different schemes of housing, and in some cases town planning, under its control. The scheme is managed on co-operative lines, the smallest tenant being a shareholder in the company. As a rule, the Co-partnership Tenants, Limited, devotes its attention to the building of cottages and housing schemes, but recently it has been laying out estates as well. The total paid-up capital of the company at the end of 1907 was £14,280, which increased by the end of 1910 to 145,000, while the cost value of land and buildings for the year ending 1910 was £800,000, and the estimated cost of property, when completed, will be well over two million pounds. Additional estates are to be added in 1911, which will add about one million to the value of property under development. It should be added that a generous allowance is made for depreciation; in fact, the whole of the houses on the estate could be rebuilt in 60 years' time out of the sinking fund put aside for that purpose. Upon the whole, looking at the readiness with which houses are sold or let in garden cities in the immediate neighborhood of London and other large towns—there is a remarkable example at Hull, which garden city experts would do well to study—we can express our confidence in this movement. It has a great future, and its finance (though it needs careful attention) should present no insuperable obstacles.

Compactly Designed City Dwelling

Suitable for a Narrow Lot and Planned to Give Maximum Accommodation for Limited Area.

Pleasing in elevation and in plan, compact and systematic in the arrangement of rooms, the principle of true economy has been considered throughout, and the result is a homelike structure at low cost.

In order that a small house may be built at a moderate cost, it need not be a structure devoid of architectural treatment in its design. By architectural treatment a reference

statement, an appreciation of which should go far to remove his misapprehension.

Good and bad in architecture may be considered respectively, synonymous with proper and improper use of building materials, and that the cost of a small house may be kept as low as possible it is essential that the materials on hand be used with stringent economy.



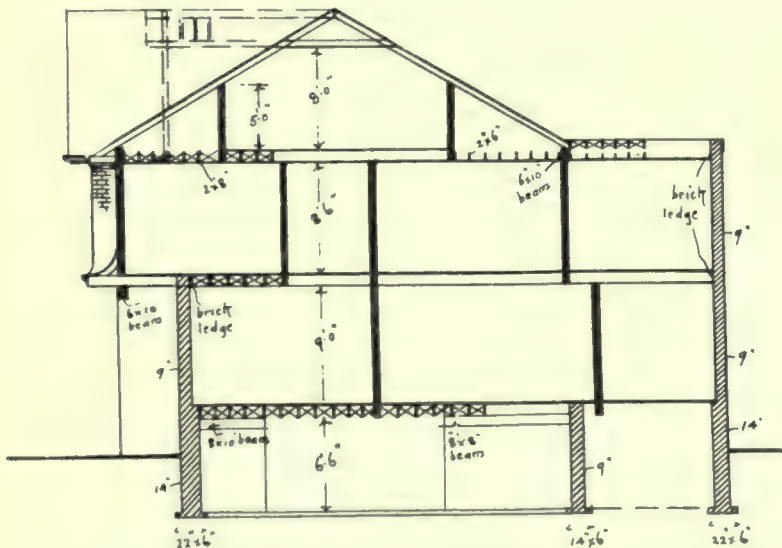
Front Elevation.



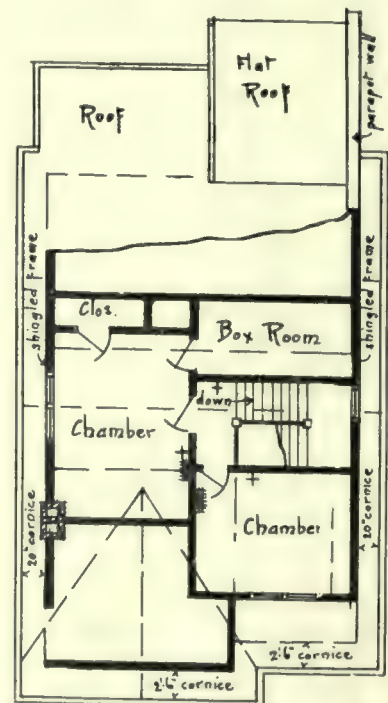
Side Elevation.

is made not only to art in the design of an elevation: these words must also imply that the designer has expressed in his plan intelligent consideration for the convenience of those who are to make the completed edifice a home. Contrary to the erroneous belief held by some, that architecture in building is an embellishment or something that may be added to adorn a costly or elaborate work, we offer the following

A large house may be built of costly materials, and yet, if the originator of the design be unskilled, that house will be inferior to the cottage beside it, where every feature is the creation of genius and study, and has been designed with the twofold purpose of playing its part as a structural motive and playing that part in a way which will most please the eye.



Cross Section,



Attic Floor and Roof Plan.



Side Elevation.



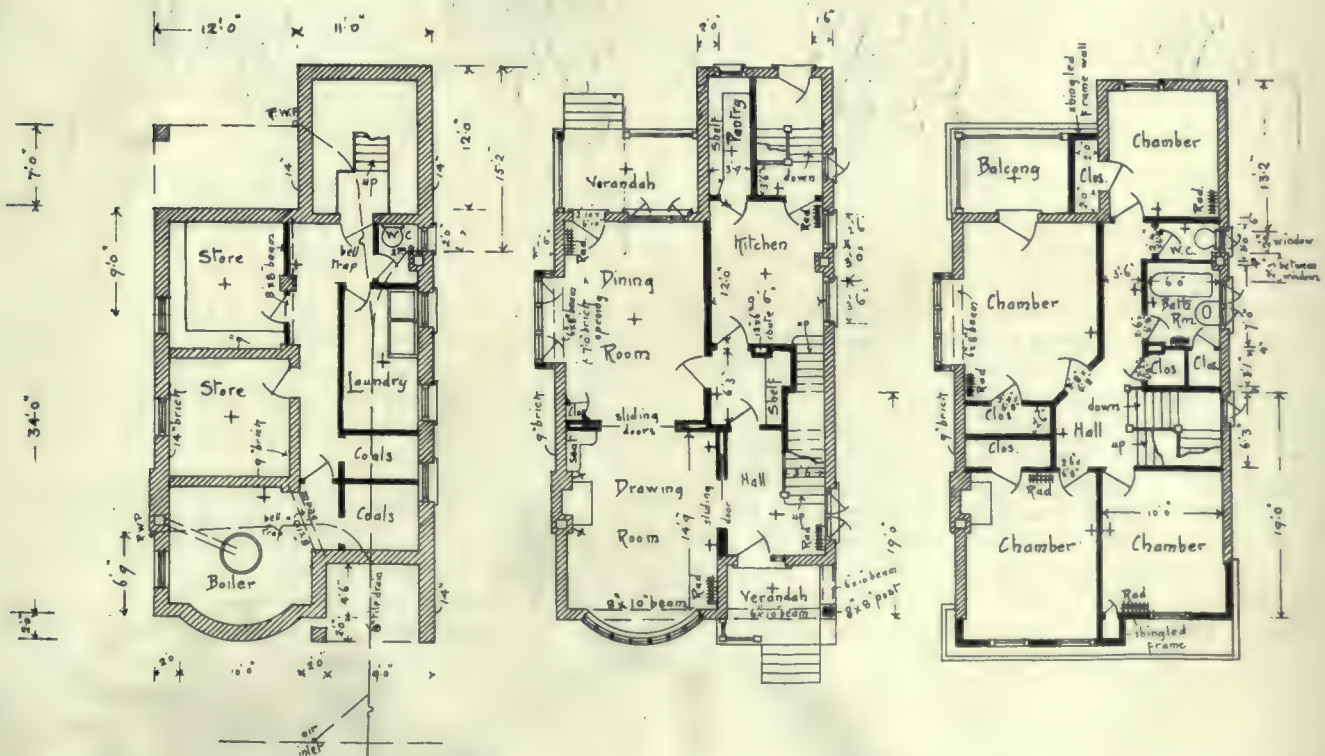
Rear Elevation.

As public opinion is being educated to an appreciation of that which is good in architecture, an ever increasing demand is being constantly manifested for a better grade of work. The practical man cannot but see that such a demand exists, and if stirred by no higher motive, the prospect of personal financial gain will be sufficient to arouse interest in the foregoing facts.

The demand for real design in the small dwelling cannot be supplied by the competent architect in the ordinary way; the cost in itself is prohibitive. This demand the

CONTRACTOR AND BUILDER will attempt to satisfy within its radius of circulation. In each number, a set of drawings will be published, showing a house of moderate cost, in which comfort, convenience, taste, and refinement have been considered alike in plan and elevation.

The design in this issue is one of an attractive house which has been built among the smaller houses of Toronto's delightful residential section, College Heights. While pleasing and original in exterior design, the feature of the whole structure is the economy of space in plan.



Basement Plan.

Ground Floor Plan.

Second Floor Plan.

A Study of Corner Decoration

Corner Ornamentation Usually Left to Decorators—Various Suggestive Designs for Corner.

Corners are not primary features of Architecture or Decoration. Who would think of putting the most important portion of an ornamental scheme in a corner? But, nevertheless, an earnest study of corner ornament is required of the decorator.

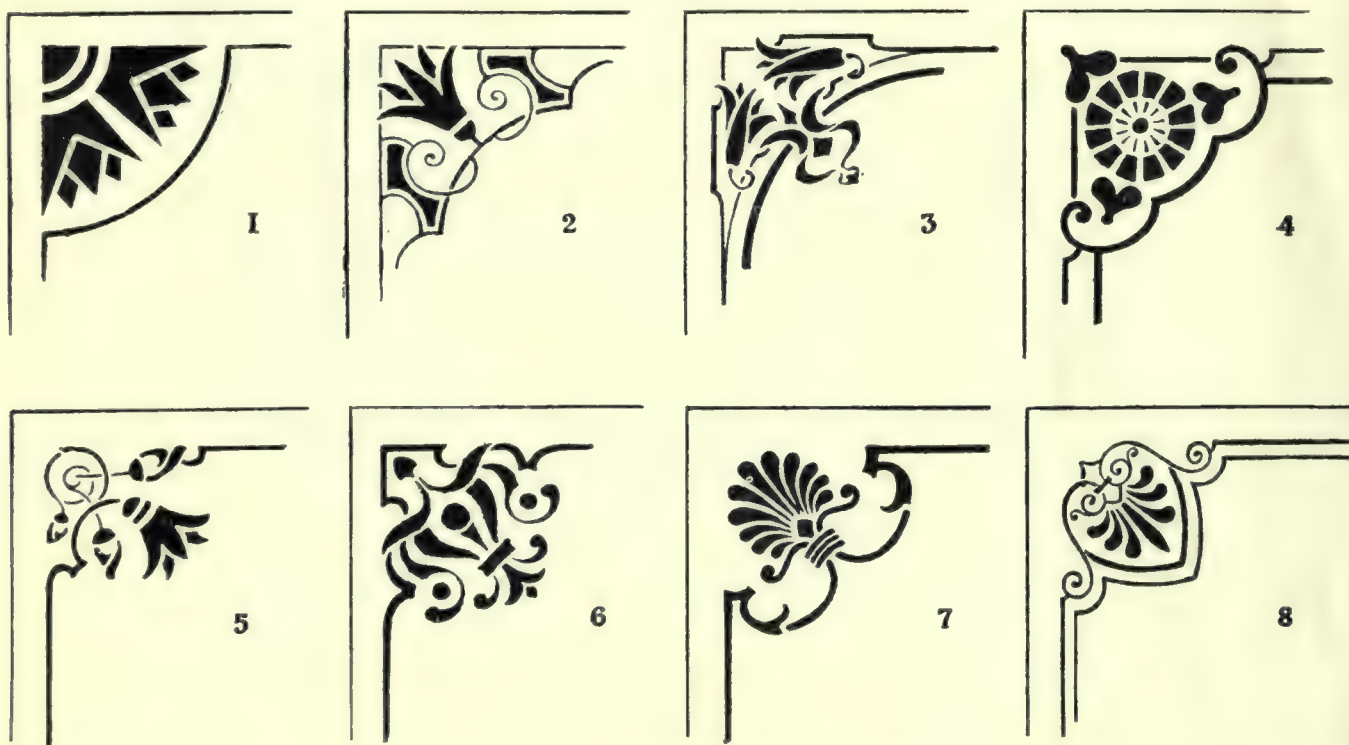
Architects are generally concerned with the masses, projections, divisions, and mouldings of a building; they usually leave the corners to decorators and plasterers.

The shape under our notice is noteworthy by reason of its being a saver of labor; therefore it may be looked upon as an economical shape. Supposing a number of panels are to be decorated, and the money to be expended will not allow the whole surface to receive ornament. We are compelled to turn to enclosing lines, corners and centrepieces. These may be elaborate or otherwise, according to taste.

distance from the spectator's eye. For this reason a specially designed stencil is better than any stencil the decorator may have in stock.

Sometimes ornament is placed on lofty ceilings, in which the shapes cannot be seen clearly, owing to the details being too fine. In other cases the forms are big and clumsy because large stencils are used on low ceilings.

It is very disagreeable to be seated in a room and be oppressed by the feeling that the ceiling is continually threatening to fall. Good design should instil comfort in the mind of a spectator, not uneasiness. If the building is used mostly in the evening, good work is often thrown away owing to poor lighting and shadows from heavy projecting mouldings. In places where the electric light is used the pendants are generally hung much lower, thereby giving the



If cost is a consideration—it generally is—a simple corner with connecting lines will suffice; if the cost will admit of more labor, the corners may be quite important, and allow not only of stencilling but pencil work.

Take a ceiling, for example. If the panels are many, elaborate corners will make the ceiling look over-ornamented. A very simple corner looks elaborate when there is much repetition, and if the ceiling contains forty panels, the corners will number one hundred and sixty. This fact is often overlooked by young designers.

A panel may also appear to be in good taste when only one sketch is shown, but due consideration must be given to its repetition in thirty or forty panels.

Another consideration is the color. If corner No. 1 was treated in loud tones the ceiling would in all probability look too heavy, especially if it was a low one. The size of ornament and strength of color must be judged according to the

decoration a better chance of being seen. There is also less risk of the work being blackened, as is the case when gas is used.

In upright panelling the top left corner may be balanced by the ornament on the right, whilst the bottom ornaments may be cut down or left out altogether.

Although a corner is of simple shape, the methods of its treatment are very numerous. Nobody can say that one arrangement is the right and only one, but great scope is given to the designer's invention.

Ceiling corners are better when multi-symmetrical, though much variety may be gained by the exercise of a little taste. Some panels may be emphasised by more elaborate designs than others, along with more striking colors; whilst others may have simpler color or none at all, being bounded by lines or bands.

The color of the panels themselves may be varied,

especially when larger in size. If the panels are all of the same dimensions it is monotonous when they are all decorated alike. A much better effect is attained when some of them are varied in design and color.

Walls are not panelled to the same extent as ceilings, but the same considerations of variety apply to them. A painter has more chance of varying his work than the joiner, for stencils can be cut at a small cost compared with the expense of altering the sizes of woodwork. A painter is also allowed more liberty by the architect than the joiner.

Corners are not all right angled, but practice in filling a right-angled corner will enable a decorator to cope with any shape that might present itself. Some adaptations from ancient ornament made specially suitable for stencilling, are here given, and though a considerable amount of liberty has been taken with the originals, the characteristics of the various styles are so sufficiently preserved that a person with a knowledge of Historic Ornament can tell at a glance the course whence the ornament is derived.

The ancients did not make a feature of corner ornamental

scrolls, the whole arrangement showing more freedom than the preceding example.

Fig. 3 is a lotus design with more variety in its composition, which has a very modern appearance, though the details are taken from Egyptian work. This would stencil well and be quite suitable for use in present-day work.

Fig. 4 is the front view of a conventional circular flower. This would be very appropriate for a ceiling where strength is required, the design being very firm and solid. The petals radiating from the centre spot give an appearance of repose, and check the wandering tendency to be seen in a more florid example. The circular flower is the prototype of the rosettes which were used in later periods by the Greeks, and the leaves are very similar in shape to some which are to be found on Grecian vases.

Fig. 5 is a quiet, simple example of flowing lotus ornament, which could be used with equal success either on a ceiling panel or an upright one. This could be easily executed, and with the connecting lines a panel could be ornamented with little cost.



tion. Probably the reason was that time and labor were of so little value that they would rather cover the whole surface of a panel than decorate the corners alone. Another reason is that the remains of their work are purely architectural, and, as we have mentioned before, architects make very little use of ornamental corners. If painted corners were used they would have faded away years ago. Sculptured work alone can survive the wear and tear of centuries.

Fig. 1 is an arrangement of the Egyptian lotus, which is very conventional in treatment. This would be serviceable where a simple corner is desired, but great care should be taken not to make the color very strong or the ornament would be too heavy. The simplicity of the design makes it a good example of conventionalised ornament, and specially suitable for such a subordinate position as a corner.

Fig. 2 is a rendering of the lotus in combination with scrolls. The solid portions of the flower and filled-in background contrast well with the line work of the stems and

Fig. 6 is a full design which would harmonise with a large, flat space. The circular forms are used in a very subordinate position in the design, but are none the less effective.

Fig. 7 is based on foliage from the Assyrian "Tree of Life." Though its ancient symbolism has departed, it is worthy of being used as pure ornament. This is undoubtedly the origin of the Greek anthemion ornament, and is easily adapted to corner treatment.

Fig. 8 is an example of Greek anthemion ornament generally known as the "honeysuckle." Decorators of all the later periods have used this ornament, and it is difficult to get rid of its influence. Its beautiful radiating lines and simple construction have given it this popularity, which gives it precedence over intricate patterns like those invented by Mohammedan, Celtic and Elizabethan designers.

Fig. 9 is another simple and beautiful variation of this kind of ornament. It is often used alternately with the

preceding pattern in borders, friezes, etc. The number of these anthemion patterns is unlimited. They were used on buildings, furniture, vases, domestic utensils, and on practically every article that the Greeks used in their daily vocations. Beauty was considered as well as use when designing an object, which is more than can be said of present-day articles.

Fig. 10 is a pattern that would do either for a horizontal or an upright panel, and will bear repetition. It may be here noted that the ornament is leaving the stiff and conventional forms and becoming more naturalistic. This is evidence that the ancient designers were turning more directly to Nature for their inspiration.

This is clearly shown by the acorn and leafage in design No. 11. The foliage is not from the oak, the Greeks taking the liberty of combining details from two different plants in one design. They probably felt that oak foliage was not suitable for their purpose, and substituted the small three-pointed leaf here given.

Fig. 12 is specially suitable for a square panel, the straight lines giving strength and unity to the composition, whilst contrasting harmoniously with the conventional foliage without becoming unduly harsh.

Fig. 13 is a combination of two anthemions, which shows how strength can be achieved by means of curved lines. The fact of the lines being well tied together goes far to accomplish this, and emphasises the old saying that "Unity is Strength!"

Roman ornament is not very suitable for corners owing to its showy character. A corner filled with Roman foliage is apt to be too prominent in a decorative scheme, unless there is a centrepiece with human or animal forms in its composition.

Students may in Fig. 14 see the origin of many of the details used in the Renaissance style, for the Roman acanthus is the variety adopted by the designers in that style. The illustration shows an adaptation from the Roman ornament for corner purposes. This style depends so much on profusion of detail that a corner like this does not show itself to advantage. The mythical animal forms are also so characteristic of this style that the ornament looks insipid without them.

Figs. 15 and 16 are adaptations from the Roman painted style known as Pompeian. In this we get actual specimens of Roman decorative work, and it is naturally lighter and freer than the sculptured work. Nature is largely drawn on in this style, some of the painting being direct from the natural objects. These are more suitable for domestic decoration than for a massive public building. No. 15 would be best fitted for a ceiling, whilst No. 16 would do either for a ceiling or an upright panel.

When working corner stencils it is best to set the work out with chalk lines first, and not fit the stencil to the mouldings. Plaster work is very rarely accurate, and the decorator who relies on mouldings alone is liable to get his work distorted. The corners should always be stencilled in first, the width of the connecting lines having been cut out along with the ornament. From these the lines should be struck with the chalk line, the whole panel being lined the last.

In acanthus foliage like Fig. 14, loose ends are often left. Unless great care is taken these are apt to curl up, with disastrous results to the ornament. The best plan is to cut two stencils at the same time, in order that one of them may be cleaned whilst the other is being used. Two stencils should be cut of patterns like Figs. 5 and 10, so that the two corners

can be stencilled in at the same time. If only one is used it will have to be wiped and dried before the balancing ornament in the other corner can be stencilled.

Sometimes the angle formed by the plaster mouldings is not a correct right angle. In these cases do not stencil the lines from the stencil, but indicate them on the plaster with a piece of chalk.

The colors may be varied, often with great advantage to the ornament, though many painters are chary in doing this.

In drawing out the stencils the angle should be accurately drawn, and here a knowledge of geometry is helpful. Where the ornament is symmetrical, one-half of the angle may be drawn—the paper doubled on the centre line—and both sides cut at the same time.

—By P. C. RILEY, in *Decorators' and Painters' Magazine*.

Material Required per Cubic Yard of Concrete

The quantities of cement, gravel or broken stone required to make a yard of concrete will vary on different jobs depending on the percentage of voids caused by the varying sizes of the gravel or broken stone.

If the best results are desired care must be taken in proportioning the materials especially the cement. The ordinary contractor is sometimes content with very approximate values. He allows one barrel of cement to a cubic yard in a 1:3:5 mixture and one and one-half barrels to a cubic yard in a 1:2:4 mixture. The values obtained in the following tables may be taken as good averages.

The reader is warned against accepting tables from ordinary American text books or periodicals without examination. The American barrel of cement and the Canadian is not the same size.

The average American barrel contains 3.8 cubic feet the Canadian barrel 3.5 cubic feet, hence the unreliability of most American tables.

The Canadian barrel of cement weighs 350 lbs. and nine out of ten engineers specify cement to be 100 lbs. per cubic foot. The tendency being to proportion this material by weight since it runs from 84 lbs. loose to 114 lbs. packed, per cubic foot.

MIXTURE	Broken Stone			Gravel		
	Cement in bbls.	Sand cu. yds.	Stone cu. yds.	Cement in bbls.	Sand cu. yds.	Gravel cu. yds.
1:1:3	2.49	0.32	0.97	2.25	0.29	0.88
1:1½:3	2.23	0.43	0.87	2.04	0.39	0.79
1:2:3	2.02	0.52	0.79	1.86	0.48	0.72
1:2:4	1.77	0.46	0.92	1.61	0.42	0.83
1:2:5	1.57	0.41	1.02	1.42	0.37	0.92
1:2:6	1.42	0.37	1.10	1.27	0.33	0.99
1:2½:5	1.47	0.47	0.95	1.33	0.43	0.86
1:3:5	1.37	0.53	0.89	1.25	0.48	0.81
1:3:6	1.35	0.48	0.97	1.13	0.44	0.88
1:3:8	1.06	0.41	1.10	0.95	0.37	0.99
1:4:7	1.04	0.54	0.94	0.94	0.49	0.85
1:4:10	0.85	0.44	1.10	0.76	0.39	0.98

Outline of Plate Glass Situation

The plate glass industry in America is still young not having been established in the United States much over thirty years. As no plate glass is manufactured in Canada, all requirements being imported, the situation in the United States and its connection with the European market as outlined by an authority will be of interest.

Plate glass making was established in France, at St. Gobain in 1665, and at St. Helens, England, in 1773. When first commenced in the United States in 1867, Belgium was making in the neighborhood of a million square feet every year.

In 1867 the total European output is given at about 10,000,000 square feet. Ten years later, in 1877, this had increased to about 16,000,000 square feet, and of this, France contributed 5,400,000 square feet. England contributed about the same quantity as France, and Belgium furnished 2,250,000 square feet. The remaining 3,000,000 square feet was produced by the European factories in Germany, Russia and Bohemia. The value of the 16,000,000 square feet produced by the European factories during the year 1877 has been authoritatively placed at \$12,000,000.

Coming down to the situation at the present time, the year 1904 is the turning-point of the foreign plate glass industry. It was at this time that the entire European industry was suffering from an acute crisis. Competition was so keen that the bottom dropped out of the market and prices reached such a level that practically every factory was showing a loss. Raw materials were advancing generally and, of course, having their effect on the cost of the finished plate glass. Out of this there arose the so-called International Syndicate. At its formation the estimated production of all of the plate glass factories of the world was 107,600,000 square feet. Of this the syndicate controlled about 60,000,000 square feet, or well over half of all of the plate glass made in the whole world.

The syndicate controls at present five factories in France, seven in Belgium and eight in Germany. Of these eight German factories, five are owned and operated by Germany; one is a branch of a Belgium concern, and the other two belong to and are operated by French interests. Bohemia has a factory owned and controlled by Belgians, while Holland and Italy each have one plant controlled by the French interests. To sum up, the French have nine factories under their control, the Belgians nine, the Germans five, all of which are amalgamated under the International Syndicate, as it is called. One factory at Courcelles, Belgium, is owned by the American Pittsburgh Plate Glass Company, while a factory at Manbenge is controlled by English capital. These two plants and two in England and two in Russia are not controlled by the syndicate. The United States has twenty-one factories producing plate glass, of which nine are controlled and owned by the Pittsburgh Plate Glass Company.

The plants controlled by the syndicate send a great deal of plate glass to the United States. All of this glass is sent on the basis of tabulated prices set by the syndicate, from which there is absolutely no deviation by any of the factories under the syndicate's control.

Improved Heating of Rooms

It is fallacy to compare methods of heating rooms by the simple application of the thermometer, writes Dr.

Percy Wilde in "The London Times." Thus, given a room to be heated for 10 or 12 hours a day, the various methods of heating, in order of cheapness, will run as follows: (1) Hot-water or steam radiators; (2) anthracite or closed coal stoves; (3) open coal fires; (4) gas stoves; (5) electric stoves.

Both the first two methods depend upon heating the air of the room by convected heat from metal at a high temperature. This decomposes the air of the room and renders it prejudicial to health. The coal and gas fires give radiant heat, which warms the objects in the room and only warms the air by the convected heat derived from them. This means that the air of the room is warmed by convected heat at a low temperature, which is alone sanitary. The fifth method, electric heating, is simply futile and has nothing to recommend it either on the score of efficiency, economy, or hygiene.

The gas and the coal fires are not economical because a current of cold air is passing through the fire to the chimney or flue pipe, which not only carries away the heat, but prevents its proper radiation. The whole problem of heating resolves itself into this: (1) Get rid of the flue pipe or chimney; (2) condense all the fumes; (3) allow none to escape into the room.

This is regarded as a scientific impossibility. Yet I write in a room where this process has been working for many months. It is a large room, and the cost of heating by gas is $\frac{1}{3}$ d. ($\frac{2}{3}$ cent) per hour. The method has not yet been made public, but until it has, discussion upon the subject of domestic heating can lead to no result. The latest discoveries will revolutionize all our thoughts, and gas will prove the most economical, convenient, and hygienic method of heating.

A Condensing Gas-Stove

A week later "The London Times" published the following description of the new room-heating device: "In the condensing gas-stove referred to by Dr. Percy Wilde in his letter last week, the fumes from the burnt gas rise into a flat, oblong tank, about 3 feet long, which forms the top of the stove. Thence they are conducted by four tubes, also about 3 feet long, down to a similar tank, which constitutes the base. This tank contains water and slaked lime, and the fumes, cooled by their circulation through the apparatus and by contact with the water, pass round to meet the hot fumes in the flue behind the burners. The result is rapid condensation with production of a vacuum, which causes the draft necessary to draw air into the fire. The water of condensation absorbs the carbonic acid, and, trickling down into the bottom of the tank, combines with the lime, forming carbonate of lime, which, being insoluble, is precipitated. As the slaked lime is used up, the carbonic acid combines with the carbonate of lime to form bicarbonate, which is soluble, and the solution, when its amount becomes excessive through the constant additions of condensed water, is drawn off by a small tap. It is stated that 8 pounds of slaked lime will last 5 or 6 months before being dissolved with a fire consuming 8 or 10 cubic feet of gas an hour, and burning, say, 12 hours a day. Radiant heat is emitted from the burners, which are of the Bunsen type, heating asbestos strings, through a talc front, while the metal surfaces of the top tank and the pipes that lead to the bottom tank, the temperatures of which it is said do not exceed 100 deg. C., gently warm the air of the room by convection."



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Ontario.

POWER OF ARCHITECT TO DISMISS CONTRACTOR.

The plaintiffs contracted to do the carpenter work upon a house to be erected upon the defendant's land. Clause 4 of the contract provided that "in case the works are not carried on with such expedition and with such materials and workmanship as the architect may deem proper, then, with the special and written consent of the proprietress (the defendant), the architect shall be at liberty to give the contractors three days' notice in writing to supply such additional force or material as, in the opinion of the said architect, is necessary, and, the contractors failing to supply the same, it shall then be lawful for the said proprietress to dismiss the said contractors, and to employ other persons to finish the work in such manner as the architect may direct, and in accordance with the plans and specifications." The plaintiffs, before they finished their work, were dismissed by the defendant, who employed others to finish it. Upon appeal and cross-appeal from the judgment of an official referee in an action to enforce the plaintiffs' lien under the Mechanics and Wage-Earners Lien Act:—

HELD, that the words "in such manner as the architect may direct" applied to the mode of completion, and made his direction final; and so, if the clause applied, the plaintiffs could not complain that, by direction of the architect, the work was finished by day-labor, instead of by contract after advertisement and tender.

It was contended that Clause 4 did not apply at all, because the time for completion of the work had been extended, and the notices given were not in conformity with the requirements of the clause:

HELD, that if this were so (as to which no opinion was expressed), the dismissal was wrongful; but the contention did not aid the plaintiffs, because, if the dismissal were wrongful, what they would be entitled to recover as damages was the amount that would be coming to them on the footing of the contract if they had been allowed to complete the work, and that was what had been awarded to them by the referee.

The lien-holders (other than wage-earners) claiming under the contractors (the plaintiffs) contended that the defendant must account to them for 20 per cent. of the value of the work done, and could not resort to this 20 per cent. to recoup herself for the damages sustained by the contractors' breach of contract:

HELD, that in this case, where the contract was, upon the evidence, a losing one for the contractors, "the value of the work done," to the contractors and those claiming under them, could only be arrived at by taking the contract-price,

plus the extras, and deducting the omissions and the cost of completion, including rectifications.

AND HELD, that Sec. 12 of the Act recognizes that the charge is a charge upon money to become payable to the contractor; and when, by reason of the contractor's default, the money never becomes payable, those claiming under him and having this statutory charge upon this fund, if and when payable, have no greater right than he himself had, and their lien fails.

Other provisions of the Act considered.

Russell vs. French (1897), 28 O. R. 215, not followed.

Goddard vs. Coulson (1884), 10 A. R. 1, and *in re* Sear and Woods (1893), 23 O. R. 474, followed.

Judgment of the official referee varied in accordance with the above and in other respects. Farrell vs. Gallagher, 23 O. L. R. 130.

Appeal by Keating and Sunridge from the judgment of J. A. C. Cameron, an official referee, in a mechanics' lien action to enforce a lien for bricks supplied in the erection of a certain building. The referee dismissed the claim. The appeal was heard by Falconbridge, C.J.K.B., Britton and Riddell, JJ., and dismissed with costs. Riddell, J., gave written judgment in which he stated that the court had called upon the referee for the reasons for his judgment, which had been furnished, and from which it appeared that the brick which it is claimed kept the lien alive, were furnished after the building was completed, and were not to be used in the building. This was the outcome of a scheme between the parties, in bad faith, to advantage the appellants at the expense of others and does not come within the Act.

Renney vs. Dempster, 2 O. W. L. 1303.

Saskatchewan.

FAILURE TO COMPLETE CONTRACT IN SPECIFIED TIME.

The plaintiff entered into a contract with the defendant to erect a certain building, to be completed within a limited time, and a penalty of \$25 per day was stipulated in case the building should not be completed within that time. The building was not completed within the time limited, but it appeared that the delay was due to the failure of the defendant to furnish certain material which he undertook to furnish. The contract provided that the architect might grant an extension, and required him to certify to such extension. The architect verbally extended the time, but did not certify to it. It also appeared that the plaintiff had assigned all his interest in the claim sued for to a third party. Judgment having been given for the plaintiff without any deduction for the delay, the defendant appealed.

Held, that, while by the provisions of c 41 of C.O., 1898, the assignee of a chose in action may bring an action in his own name, yet, as by such ordinance the right of the assignee to proceed as if the ordinance had not been passed is expressly reserved, and as the previous practice required the action to be brought by the assignor, the action in this case was properly brought. 2. That the parties having expressly agreed upon a "penalty" of \$25 per day upon default, such sum could not be regarded as liquidated damages or otherwise than as a penalty. 3. That, as it appeared that the delay was caused by the default of the defendant, the plaintiff was by such delay exonerated from the penalties and excused from the performance of the work within the time limited. *Covert v. Janzen* (No. 2), 1 Sask. L.R. 429, 9 W.L.R. 287.

In an action for damages for injuries sustained by the plaintiff while in the employment of the defendants and engaged in loading a ship, the plaintiff alleged: (1) negligence of the defendants at common law because their system of doing the work was defective; and (2) liability under the Employers' Liability Act, Sec. 3, Subsec. 2, because of the negligence of a person having superintendence intrusted to him, etc. The second ground was not actually pleaded, but the action was tried on the assumption that it was pleaded, and the defendants sought to show by evidence that the defendants' foreman was not negligent. The evidence showed that the foreman found the sling-loader absent from his place, and, presumably in order not to retard the work of loading, he voluntarily loaded the sling himself; some sticks slipped out, fell on the plaintiff, and caused the injury complained of. The jury found a general verdict for the plaintiff, after which the defendants contended that, if the injury was caused by the defendants' foreman, it was not caused by him while in the exercise of superintendence:

HELD, that the defendants were not in a position so to contend; and that there was evidence, both of defective system and of negligence of a person intrusted with superintendence, which could not have been withdrawn from the jury; and, therefore, there should be judgment for the plaintiff. *Poon v. Brown & McCabe*. 16, W. L. R. Page 120.

REGISTRATION OF LIENS

The defendant B. was an equitable mortgagee of the land the title to which was subject to a mechanics' lien registered by the plaintiffs in December, 1907, and to other liens afterwards registered. The action was brought by the plaintiffs to enforce their lien; and by an order made on the 21st of May, 1908 the amount which the plaintiffs were entitled to recover was fixed at \$756.55, and it was directed that, in default of payment of that sum, the land should be sold, and the proceeds of sale applied: first, in payment of B.'s claim; second, in payment of the expenses of the sale; third, in payment of the costs of the action; and the balance was to be paid into Court, to be distributed among the lien-holders as their interests might appear. On the 6th of May, 1909, an order was made directing the Local Registrar to ascertain and report the facts relevant to the determination of the question of the right of B. against the land and his right to priority over the plaintiffs. The Local Registrar reported that the land was sold to B. on the 16th of April, 1910, for \$1,725; that the materials in respect of which the plaintiffs were entitled to a lien, were delivered between the 26th of September and the 12th of

December, 1907; and that the sums advanced by B. for the purchase of the land and improvements thereon amounted to \$1,189.60, and was advanced in various sums between May and October, 1907—\$500 being for the purchase of the land—and that B. also advanced to his co-defendants the further sum of \$783.40, no part of which was expended for work or materials which enhanced the value of the lands. The Local Registrar did not find, nor was there any evidence to establish, to what amount the selling value of the land was increased by the placing of the materials supplied by the plaintiffs:

HELD, upon consideration and construction of Sub-sec. 3 of Sec. 7 of the Mechanics' Lien Act, 1907, that the onus of proving that the selling value of the land was increased by the materials furnished and placed above what it was before they were so furnished and placed, was on the plaintiffs, and they had failed to establish it. It did not follow from the mere fact that materials were furnished and placed upon the land by the plaintiffs and other lien-holders, that the selling value of the property had been thereby increased to the extent of the materials furnished or at all.

Kennedy v. Haddow, 19 O. R. 240, applied and followed.

HELD, also, that paragraph 3 of Sec. 2, of the Act deals simply with the definition of the word "owner," and does not apply to a mortgagee, or at any rate to one who has registered his mortgage prior to the registration of the lien. The right of priority as between the lien-holder and the mortgagee is fixed by paragraph 1 of Sec. 13, of the Act; and, so far as a mortgage, equitable as well as legal, is concerned, it would have priority over a lien, if registered before the lien.

Richards v. Chamberlain, 25 Gr. 402, *McVean v. Tiffink*, 13 A. R. 1, and *Reinhart v. Shutt*, 15 O. R. 325, specially referred to.

Notice cannot affect the question of priority. Where the lien-holder has not registered his lien, the mortgagee need not hesitate to advance money legitimately under his mortgage, because possibly the lien-holder might thereafter register his lien.

The whole amount advanced by B., \$1,973, was found to be a charge on the land under the mortgage; and, as all the sums making up that amount were advanced or expended before any of the liens were registered, and the question of an increased value was out of the road, and the land sold for only \$1,725, B. was entitled to the whole of that sum. *Independent Lumber Co. v. Bocz*. 16 W. L. R. 316.

Alberta.

INJURY CONTRACTED WHILE OPERATING A DANGEROUS MACHINE.

The plaintiff was employed in the defendants' planing mill from the 1st of October to the 18th of December, 1908, and on the last-named date, when operating a machine known as a joiner, had 3 fingers of his right hand injured so as to necessitate amputation. The plaintiff, to the knowledge of the defendants, was inexperienced in operating such a machine. He received some instruction from the foreman, by whom he was put to work at this particular machine on the day of his injury, he having previously worked at other machines. This was a dangerous machine:

Held upon the evidence, Beck, J., dissenting, that the judgment of Harvey, C. J., dismissing the action, on the ground that no negligence was shown, should, on the evidence, be affirmed.

Per Stuart, J., that the danger was one of which the plaintiff could judge as well as the defendants; there was nothing latent or concealed, and no increased danger was shown which would require a warning, under the principle which lays that duty upon the master.

Per Simmons, J., that the action failed because the cause of the injury had not been brought home to the defendants as arising out of any other than the danger ordinarily incident to the operation of machines of this nature, and that there was no exposure of the servant to any risk of which he was ignorant and of which the master had knowledge.

Per Beck, J.: The evidence showed a dangerous machine, known to the defendants to be so; an experienced workman; dangers obvious, even to an inexperienced man, so long as the tables were level; dangers much increased when the tables were so adjusted as to be out of level; the machine so adjusted, that, though the method of adjustment was explained, the increased danger was not explained; and an accident happening to the workman while conditions increasing the dangers existed. Upon these facts, there was a prima facie case of negligence which should have been submitted to the jury, if there had been a jury; and there was a reasonable probability that the plaintiff would not have suffered the injury but for the negligence, that is, the want of warning and instructions on the part of the defendants, and that the consequent inference should be drawn, in the absence of evidence to rebut it. *Williams v. Western Planing Mills Co.*, 16 W. L. R. 13.

Yukon Territory.

EMPLOYERS' LIABILITY

In an action for damages for injuries sustained by the plaintiff, while working for the defendants, in their mine, the evidence showed that the plaintiff was injured by water rushing through the mine, and that he had been warned that when a rush of water occurred he should lie on the side of the flume in the tunnel, instead of which he endeavored to get out of the tunnel at its mouth when he heard the rush of water, but was overtaken and so injured. The following questions were left to the jury, who made the following answers: (1) Have the defendants or their servants done anything which persons of ordinary care and skill, under the circumstances, would not have done, or have they or their servants omitted to do anything which persons of ordinary care and skill, under the circumstances, would have done; if so, what was it? A. We agree that the foreman might have explained the danger more fully to the men. (2) Have the defendants or their servants by any such act of commission or omission caused injury to the plaintiff? A. To a certain extent they have. (3) If you find... that the defendants or their servants are guilty of any act or omission, who was the person, if any, who committed such act or made such omission? A. The foreman F. (4) Did the plaintiff do anything which a person of ordinary care and skill would not have done, under the circumstances, or omit to do anything which a person of ordinary care and skill would have done, under the circumstances, and thereby contribute to the accident? A. We think the plaintiff might have used better judgment. (5) Did the plaintiff, knowing the nature and condition of the works, and fully appreciating the risk of accident he ran by working in the tunnel referred to, under the circumstances voluntarily assume to take such risk upon himself? A. We agree that the plaintiff did to a certain extent appreciate his danger, but not fully

under the circumstances. (6) If the plaintiff is entitled to recover, what is a fair sum to allow by way of damages? A. We think that the plaintiff is entitled to \$900 damages. Judgment was entered for the plaintiff upon these findings, and the defendants appealed.

HELD, that the answers of the jury were neither conclusive nor satisfactory, and there should be a new trial; no costs of the former trial; but costs of the appeal to the defendants.

Per Dugas, J.—The main point was not whether F. had sufficiently explained the danger to the men, including the plaintiff, or whether the plaintiff himself might have used better judgment, realizing to a certain extent to what danger he was exposed, but whether the men should have been exposed to that danger by F. Although the plaintiff knew of the danger, there was no implication of law against him by reason of such knowledge (Sec. 6 of the Employers' Liability Ordinance, 1908); and the question whether he was in fact volens should have been answered by the jury. And the indefinite answer of the jury to the 4th question was not properly a finding of contributory negligence.

Per Curiam: Section 515 of the Judicature Ordinance having been amended in 1907 by restricting the powers of the Court, the Court can now only find facts which are not inconsistent with the findings of the jury.

Per Craig, J.—There was no finding of negligence on the part of the defendants causing the injury. Even if the jury had that negligence in mind, finding "to a certain extent" is not a finding of negligence which would warrant a verdict for damages. There must be a finding that there was a negligence which was the proximate cause of the injury. The whole of the findings, boiled down, meant that both parties might have used better judgment. There was no finding of contributory negligence, though the evidence might sustain one. The question whether the plaintiff was or was not volens should have been decided by the jury. The jury might have brought in a general verdict; they were not bound to answer the questions; the trial Judge was wrong in telling them that they must answer the questions; the answer to the last question, however, was not intended as a general verdict, but as a fixing of the quantum of damages.

Review of the authorities.

Judgment of Macaulay, J., 16 W. L. R. 83, reversed. *Skoropata. Yukon Gold Co.* 16 W. L. R. 178.

The Keith interests are to erect a \$100,000 theatre, in St. Johns, N.B., fronting on King Square, the land having been secured last fall. The St. John Railway Company, which started the erection of a new concrete and brick car barn, last fall, will complete the structure this spring. Other buildings nearing completion are: The addition to the telephone exchange, costing about \$40,000; the King Edward school, costing \$39,000, and the remodelling and enlarging of the Bell building for the board of school trustees.

It is probable also that public sanitoriums or "comfort stations," will be established in the city this year. A committee from the common council now has the matter in hand, and it is proposed to erect underground stations in King and Market squares.

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Over 50 Years of Satisfaction

When big roofs are under consideration, ultimate costs are carefully figured. Barrett Specification Roofs win on the figures ever time and for that reason most of the large manufacturing plants in the country carry roofs laid along the lines of this Specification.

The enormous plant illustrated above is a typical instance. It is the Anheuser-Busch Brewery at St. Louis, covering 70 acres, equal to 35 city blocks. 99% of these buildings are roofed with coal tar pitch, tarred felt and gravel laid along the lines of the Barrett Specification, the other 1% being steep or ornamental roofs.

The durability of these roofs has averaged over 20 years and the net cost per square foot per year of service has

been lower than that of any other roofing material.

The Anheuser-Busch people have had plenty of time to find a better and more economical roof covering if there was any, for they have been using gravel roofs of this type since 1852.

Whenever the area is large enough to set engineers and architects to looking up ultimate roofing costs, Barrett Specification Roofs are invariably used.

The Barrett Specification will be furnished free on request to anyone interested. Address our nearest office.

THE PATERSON MFG. CO., LIMITED
MONTREAL TORONTO WINNIPEG VANCOUVER

Markets

Prevailing Prices of Builders' Supplies.

Corrected July 14, 1911.

TORONTO BUILDING LUMBER

CEDAR POSTS

8 feet x 6 inch top	\$	0 30
8 feet x 7 inch top		40
8 feet x 8 inch top		50

CORNICE MATERIAL

8 x 2 Crown and Bed Mold	per 100 ft.	\$	1 25
8 x 4 Crown and Bed Mold	per 100 ft.		2 00
8 x 6 Crown and Bed Mold	per 100 ft.		3 00
8 x 1 1/2 Cove	per 100 ft.		1 00

FRAME MATERIAL

7 1/2 x 4 1/4 Pulley Stile	per 100 ft.	\$	1 75
1 1/2 x 4 1/4 Hanging Stile	per 100 ft.		3 00
1 1/2 x 4 Hanging Stile	per 100 ft.		2 50
1 1/2 x 6 Hanging Stile	per 100 ft.		3 50
7 1/2 x 3 1/4 Lining	per 100 ft.		1 10
7 1/2 x 7 1/2 Parting Stop	per 100 ft.		60
7 1/2 x 1 1/2 Sash Stop	per 100 ft.		85
1 1/2 x 5 1/4 White Pine Sash Sill or Door Jamb	per 100 ft.		4 00
1 1/2 x 5 1/4 Red Pine	per 100 ft.		3 25
7 1/2 x 5 1/4 White Pine Door Jamb No. 1 and No. 2	per 100 ft.		2 25
3 x 6 White Pine Sub Sill	per 100 ft.		6 50
4 x 6 White Pine Sub Sill	per 100 ft.		7 50
2 x 6 Oak Sill	per lineal ft.		12
2 x 8 Oak Sill	per lineal ft.		15
2 x 10 Oak Sill	per lineal ft.		20

HEMLOCK NO. 1

2 x 4 to 2 x 12 x 10 ft.	per M. ft.	\$	21 00
2 x 4 to 2 x 12 x 12 and 14 ft.	per M. ft.		19 00
2 x 4 to 2 x 12 x 16 ft.	per M. ft.		22 00
2 x 4 to 2 x 12 x 20 ft.	per M. ft.		26 00
2 x 4 to 10 x 10 to 16 ft.	per M. ft.		21 00
1 inch Sidings	per 100 ft.		18 00-19 00
1 x 10 inch and 12 inch Stocks	per 100 ft.		22 00

HEMLOCK NO. 2

\$4.00 per M. less than No. 1	per 100 ft.		40
7 1/2 x 2 Bond Strip and Strappings	per 100 ft.		
Sizing Joist and Scantling, \$1.00 per M. extra Dressing, \$1.50 per M. extra	per 100 ft.		

LATH

No. 1, No. 2, White Pine, 4 ft.	per 100 ft.	\$	4 75-4 25
No. 1, No. 2, Red Pine	per 100 ft.		4 25-3 75
M. R. White Pine, 48 inch-32 inch	per 100 ft.		4 50-2 25

PINE, Red

2 x 4, 2 x 6 x 10 to 16 ft.	per 100 ft.	\$	24 00
2 x 4, 2 x 6 x 18 ft.	per 100 ft.		25 00
2 x 8 x 10 to 14 ft.	per 100 ft.		26 00
2 x 8 x 16 ft.	per 100 ft.		25 00
2 x 10 x 10 to 14 ft.	per 100 ft.		28 00
2 x 12 x 10 to 14 ft.	per 100 ft.		31 00
4 x 4, 4 x 6, 6 x 6 x 10 to 16 ft.	per 100 ft.		28 00
6 x 8, 8 x 8 x 10 to 16 ft.	per 100 ft.		20 00
1 x 10 inch Box	per 100 ft.		28 00
1 x 12 inch Box	per 100 ft.		30 00
1 inch Mill Cull Sidings	per 100 ft.		21 00
1 inch Mill Cull Stocks	per 100 ft.		24 00
7 1/2 x 2 Strapping and Grounds	per 100 ft.		50
2 x 2 Bridging, cut to lengths for 2 x 8 and 2 x 10 Joist, per 100 pieces	per 100 pieces		1 75

PINE DRESSED

1 x 6 No. 1 Shelving, D. 2 S.	per M.	\$	35 00
1 x 8 No. 1 Shelving, D. 2 S.	per M.		36 00
1 x 10 No. 1 Shelving, D. 2 S.	per M.		40 00
1 x 12 No. 1 Shelving, D. 2 S.	per M.		45 00
No. 2 or Sound Common, \$5.00 per M. less in each case	per M.		

SASH AND FRAME

1 x 1 1/4 inch Sash, 2 or 4 lights, up to 30 x 56	per 100 ft.	\$	1 00-1 10
1 x 1 1/2 inch Sash, 2 or 4 lights, up to 40 x 60	per 100 ft.		1 25-1 45
1 1/2 x 1 1/2 inch Casements, Cellar or Fanlights, 1 to 3 lights, up to 30 x 26	per 100 ft.		50-60
Box Frames, up to 30 x 60	per 100 ft.		2 75
1 1/2 x Frames, up to 40 x 60	per 100 ft.		3 25
Door Frames, 2 x 6 Jambs and 2 x 6 Oak Sill, up to 30 x 7	per 100 ft.		3 75
Door Frames, with Transom 2 x 6, Jambs 2 x 6, Oak Sill	per 100 ft.		5 00
Cellar Frames, 2 x 6, Jambs and Sills	per 100 ft.		2 00
Casement Frames, 2 x 6 Jambs and Sills, up to 8 sq ft	per 100 ft.		2 75

MISCELLANEOUS

XXX B.C. Cedar	per M.	\$	3 75
XX B.C. Cedar	per M.		2 75
Clear White N.B.	per M.		2 80

PAIR MATERIAL IN PINE

1 1/2 x 1 1/2 x 10 treads, nosed, up to 16 ft.	per lineal ft.	\$	0.05-06
1 1/2 x 1 1/2 x 12 treads, nosed, up to 16 ft.	per lineal ft.		07-08
1 1/2 x 1 1/2 x 12, strings, D. 4 S., up to 16 ft.	per lineal ft.		06-08
1 1/2 x 2 1/2 x 8, Risers	per 100 ft.		2-50-2 75

3 x 3, 3 x 4 Hand Rail	per lineal ft.	\$	07-08
2 1/2 x 2 1/4 String Cap	per lineal ft.		02
1 1/2 x 2 1/4 Nosing and Cove	per lineal ft.		03
3 1/2 x 1 1/2, 3 1/2 x 2 1/2 String Mold	per 100 ft.		1 00-1 25
3 1/2 x 1 1/2 and 1 1/2 Filling	per 100 ft.		1 25
3 1/2 x 2 1/2, 1 1/2 and 1 1/4 Filling	per 100 ft.		1 00
3 1/2 x 2 1/2	per 100 ft.		1 00
2 1/2 x 2 1/2, 2 1/2 x 1 1/2, 2 1/2 x 1 1/4, 1 1/2 x 1 1/2 Balusters, per hundred	per hundred		0 80-1 00-1 25-1 50
4 x 4 Turned Newells, 1/2 cut up to 5 ft.	per 100 ft.		1 00
5 x 5 Turned Newells, 1/2 cut up to 5 ft.	per 100 ft.		1 25
6 x 6 Turned Newells, 1/2 cut up to 5 ft.	per 100 ft.		1 75

STAIR MATERIAL IN HARDWOOD

1 1/2 x 10, 1 1/2 x 10 1/2 to 12 Birch or Maple, nosed and cut lengths	per lineal ft.	\$	16-20
1 1/2 x 10, 1 1/2 x 10 1/2 to 12 Oak and Ash, nosed and cut to lengths	per lineal ft.		22-25
3 x 4 Oak and Ash Hand Rail, 1 or 2 members	per lineal ft.		15
3 x 4 Birch Hand Rail, 1 or 2 members	per lineal ft.		12
1 x 4 1/4-Cut Oak Veneered Hand Rail	per lineal ft.		25
2 1/2 x 2 1/4 and 3 1/4 Oak and Ash String Cap	per lineal ft.		03-04
2 1/2 x 1 1/2 Oak Baluster, D. 4 S.	per 100 ft.		1 50
2 1/2 x 2 1/2 Oak, Ash and Birch Balusters, D. 4 S.	per 100 ft.		1 00
3 1/2 x 2 1/2 Oak and Ash Cove	per 100 ft.		1 00
5 x 5, 6 x 6 Turned Birch Newells, up to 5 ft.	per 100 ft.		1 25-1 75

PINE TRIM—WHITE

2 1/2 x 4 Casing, Clear, No. 1, No. 2	per 100 ft.	\$	2 50-1 80-1 50
2 1/2 x 5 Casing, Clear, No. 1, No. 2	per 100 ft.		3 00-2 15-1 75
2 1/2 x 8 Base, Clear, No. 1, No. 2	per 100 ft.		5 00-3 25-2 90
2 1/2 x 10 Base, Clear, No. 1, No. 2	per 100 ft.		6 50-4 25-3 75
3 1/2 x 2 1/2 Quarter Round	per 100 ft.		60
3 1/2 x 2 1/2 Cove	per 100 ft.		70
2 1/2 x 6, 2 1/2 x 7, 2 1/2 x 8 Heads, No. 1	per 100 ft.		2 50-3 00-3 50
3 1/2 x 3 1/2 and 1 1/2 Neck Mold	per 100 ft.		80
1 1/2 x 1 1/4, 1 1/2 x 2 1/4, 1 1/2 x 2 1/2 Hood Mold	per 100 ft.		2 00-3 00-3 50
1 1/2 x 4, 1 1/2 x 5 Base Blocks	per 100 ft.		3 00-3 50
1 1/2 x 3 1/2, 1 1/2 x 4 1/2 Window Stool	per 100 ft.		2 75-3 25

ROOFING

3/4 Roofing (sound knotted common pine) ..	per M. ft.	\$	30 00
3/4 Roofing, Red Pine, Spruce	per M. ft.		24 00-25 00
3/4 Roofing, Spruce, No. 3 and M. C. Pine ..	per M. ft.		22 00
3/4 Roofing, Hemlock	per M. ft.		21 00

FLOORING

1 1/2 Pine flooring, face measure	per M. ft.	\$	45 00
2 1/2 x 4 and 5 inch, No. 1, No. 2	per M. ft.		30 00-27 00
2 1/2 x 4 and 5 inch, No. 1, No. 2 Red Pine ..	per M. ft.		28 00-25 00
2 1/2 x 2 1/2 and 3 1/2 Georgia Pine, B. and Better ..	per M. ft.		45 00
2 1/2 x 4 or 6 inch, No. 1 Spruce	per M. ft.		26 00
3/4 Quartered White Oak Flooring	per M. ft. strip		80 00
3/4 Plain Red Oak Flooring	per M. ft.		60 00
2 1/2 Quartered White Oak Flooring	per M. ft.		115 00
3/4 Plain Red Oak Flooring	per M. ft.		180 00

SHEETING

2 1/2 x 4 to 6, No. 1 and No. 2, V. and B. Pine ..	per M. ft.	\$	35 00-27 00
2 1/2 x 4 to 6, V. and B. Spruce	per M. ft.		27 00
2 1/2 x 2 to 3 1/2 V. and B. Georgia Pine, B. and Better	per M. ft.		45 00
2 1/2 x 2 1/2 to 3 1/2 V. and B., Pine, Face strip measure ..	per M. ft.		
2 1/2 x 2 1/2 to 3 1/2 V. and B., Georgia Pine, Face strip measure	per M. ft.		28

SIDING

2 1/2, No. 1 and No. 2, Pine Man	per M. ft.	\$	35 00-27 00
2 1/2, Spruce and Red Pine, Man	per M. ft.		27 00
No. 1 and No. 2 Feather Edge	per M. ft.		28 00-22 00

VERANDAH MATERIAL

3 x 6 Top rail	per lineal ft.	\$	0 10
3 x 5 Top rail	per lineal ft.		09
3 x 4 Top rail	per lineal ft.		06
2 x 6 Bottom rail	per lineal ft.		05
2 x 5 Bottom rail	per lineal ft.		04 1/2
2 x 4 Bottom rail	per lineal ft.		03
5-16 x 1 1/2 Lattice Work	per 100 ft.		60
5-16 x 1 1/2 Lattice Work	per 100 ft.		75
2 1/2 x 1 1/2 Balusters, D. 4 S.	per 100 ft.		1 00
2 1/2 x 1 1/2 Balusters, D. 4 S.	per 100 ft.		1 10
2 1/2 x 2 1/2 Balusters, turned up to 2 ft.	per 100 ft.		15
3 1/2 x 3 1/2 Balusters, turned up to 2 ft.	per 100 ft.		25
1 1/2 Bandsawn Balusters, finished, each	per 100 ft.		08
1 1/2 Bandsawn Balusters, finished, each	per 100 ft.		09
1 1/2 Bandsawn Balusters, finished, each	per 100 ft.		12
5 x 5 Newells, turned tops, 1/2 cut, up to 3 6 long, each ..	per 100 ft.		1 00
6 x 6 Newells, turned tops, 1/2 cut, up to 3 6 long, each ..	per 100 ft.		1 75
5 x 5 Newells, turned tops, hearts in, up to 3 6 long, each ..	per 100 ft.		75
6 x 6 Newells, turned tops, hearts in, up to 3 6 long, each ..	per 100 ft.		90

WHOLESALE AND RETAIL



DOORS



TRIM

**LUMBER FRAMES LATH
SHINGLES**

We have on hand at all times a large stock of Six Cross Panel Doors and can make shipments immediately. We are also in a position to get out Veneered Doors on short notice. ∴ ∴

WE STOCK WHITE, RED, GEORGIA PINE AND HARDWOOD TRIM.

WRITE FOR CATALOGUE AND PRICES.

PROMPT SHIPMENTS.

L. A. DeLAPLANTE LIMITED
TORONTO

HEAD OFFICE : 24 King St. West.
Room 11, Manning Arcade.
Phone Main 5912-5913.

FACTORY : 208 Main Street, East
Toronto.
Phone Beach 230-231.

WINNIPEG LUMBER PRICES.

Corrected July 12th.

JOISTS, SCANTLING AND TIMBER

No. 1. Pine, Spruce, Tamarac, Fir, Larch and Cedar.

2 x 2, up to 16 ft.	\$ 30.00
2 x 4, 2 x 6, 2 x 8, 6 to 16 ft. except 10 ft.	20.00
2 x 4, 2 x 6, 2 x 8, 10 ft.	31.00
2 x 10, 8 to 16 ft.	31.00
2 x 12, 8 to 16 ft.	33.00
2 x 4, 2 x 6 x 8, 8 to 16 ft.	32.00
2 x 10 and 4 x 10, 8 to 16 ft.	33.00
2 x 12 and 4 x 12, 8 to 16 ft.	34.00
2 x 4, 2 x 6, 2 x 8, 18 to 22 ft.	35.00
2 x 10, 2 x 12, 18 to 22 ft.	37.00
2 x 14, 4 x 14, up to 32 ft.	40.00
2 x 10, 4 x 16, up to 32 ft.	40.50
2 x 4 to 4 x 12, 18 to 32 ft.	39.00
6 x 6 to 6 x 8, 18 to 32 ft.	38.00
8 x 8, 10 x 10, 10 x 12, 10 x 14, 12 x 12, 12 x 14, 14 x 12, 14 x 16, up to 32 ft.	38.00

ONE INCH BOARDS.—WHITE PINE.

ROUGH S1S.

1st and 2nd clear, 6 and 8 in. and 12 in.	\$ 91.00 \$98.00
3rd clear.	78.00 83.00
B select.	70.00 74.00
C select.	64.00 73.00
B select.	49.00 54.00

RED PINE.

Clear.	\$ 54.00 \$59.00
Select.	48.00 53.00
No. 1, common.	40.00 45.00
No. 2, common.	34.00 40.00
No. 3, common.	28.50 37.00
No. 3 common, 4 in. and wider, mixed width.	26.50
No. 4, common, 4 in. and wider, mixed width.	23.00
No. 5, common, 4 in. and wider, mixed width.	16.50
1 x 2 and 1 x 3 strapping.	28.00
1 x 2 and 1 x 3 in. boni strips.	18.00
Clear, select and Nos. 1, 2 and 3, stock-boards, 10 to 18 ft. For 18 and 20 ft. length add per M \$3.00. Nos. 3, 4 and 5 boards, mixed width are 6 to 20 ft. mixed length.	
Spruce and Tamarac boards are same price as Nos. 3, 4 and 5 pine.	
Common fir and cedar boards, 4 in. and wider, mixed widths.	26.50
8 in. 10 in. and 12 in. stock widths.	30.00
Extra dressing add for each side or edge \$2.00	
No. 3, 1/2 in. sheeting, of pine, spruce or tamarac.	17.00

FLOORING.

No. 2, red pine, 4 in. and 6 in.	\$ 43.00 \$46.00
No. 3, red pine, 4 in. and 6 in.	38.00 40.00
No. 4, red and white pine or spruce, 4 and 6 in.	28.00 32.00
Cull, red and white pine or spruce.	24.50
Selected lengths add, per M, \$1.25.	
18 ft. long add, per M, \$2.50.	
For dressing 2 sides add, \$2.50.	
For 1 1/2, 1 3/4, or 2 in. thick add, \$5.00.	
No. 1 and 2 fir, edge grain, 3 or 4 in. and 6 in.	53.00 51.00
No. 3 fir, edge and flat grain, 4 and 6 in.	44.00
No. 4 fir, shiplap grade, 4 and 6 in.	32.00
Common 2 x 6, pine and spruce and fir.	32.00
Clear or first quality, maple and birch, 2 to 16 ft.	70.00
No. 1 or 2 quality, maple and birch, 1 1/2 to 16 ft.	60.00
Plain sawn oak, red, 3/4 in. thick, 2 in. face.	110.00
Quartered sawn, oak, red, 3/4 in. 2 in. face.	125.00

SIDING.

No. 2 and 3, white pine, 4 and 6 in.	\$ 55.00 \$45.00
No. 2 and 3, red pine, 4 and 6 in.	46.00 40.00
No. 4, red and white pine or spruce, 4 and 6 in.	32.00
Cull, red and white pine or spruce, 4 and 6 in.	24.50
Selected lengths add, per M, \$1.25.	
18 ft. lengths add, per M, \$2.50.	
No. 1 and 2 fir, and No. 3 fir, 6 in.	42.00 30.00
No. 4, fir or cedar, 6 in., shiplap grade.	32.00
No. 1 and 2 fir, novelty, 4 in.	47.00
No. 3 fir, novelty, 4 in.	42.00
First siding is 8 to 15 ft. at random.	
If lengths are specified add, per M, \$5.00.	
No. 1 and 2, clear cedar, 6 in., 8 to 16 ft. and 3 to 16 ft.	60.00 47.00
No. 1 and 2 cedar, novelty, 4 in.	54.00
No. 1 cedar bevel, 1/2 x 6 in., 8 to 16 ft. bundled	40.00
No. 1 and 3, and No. 4, British Columbia, 6 in.	50.00 45.00
No. 1 and 2, and No. 3, B. C. spruce.	50.00 44.00

LATH.

No. 1 and 2, white and red pine, mixed, 48 in.	\$ 5.75 \$ 4.50
No. 1, white and red pine, mixed, 32 in.	3.50

SHINGLES.

No. 1 and 2, B. C. cedar.	\$ 4.00 \$ 3.50
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CEDAR POSTS.

4 in. and 5 in. 7 ft.	\$.15 \$.20
4 in. to 8 in., 7 ft.	.25 .50

CEILINGS.

No. 2 and 3, white pine, 4, 5 and 6 in.	\$ 55.00 \$45.00
No. 2, red pine, 4 in. and 5 and 6 in.	43.00 40.00
No. 3, red pine, 4 in. and 5 and 6 in.	38.00 40.00
No. 4, red and white pine or spruce, 4 in. and 6 in.	28.00 32.00
Cull, red and white pine or spruce, 4 in. and 6 in.	24.50
For dressing two sides add, \$2.50.	
Selected lengths add, per M, \$1.25.	
18 ft. lengths add, per M, \$2.50.	

Trade Discount 15%

No. 1 and 2 fir, and No. 3, 4 and 6 in.	\$ 46.00 \$43.00
No. 1 and 2 and No. 3 fir, 3/4 x 4 and 6 in., 7-16 in. finished.	37.00 33.00
Fir ceiling is 6 ft. to 16 ft. at random.	
If lengths are specified add, per M, \$5.00.	
No. 1, clear cedar, 6 in. and 3 or 4 in., 8 to 16 ft.	60.00 50.00
No. 1, clear cedar, 3, 4 or 6 in., 5 to 7 ft.	40.00
No. 1, clear cedar, 3/4 x 3, 4 or 6 in., 7-16 in., finished, 8 to 16 ft., 5 to 7 ft.	43.00 36.00
Cedar ceiling is 6 ft. to 16 ft., odd and even lengths at random.	
If lengths are specified add, per M, \$7.00.	
Cedar and fir for dressing two sides, \$3.00.	
No. 1 and 2 and No. 3, B. C. Spruce, 4 and 6 in.	50.00 45.00

FINISHING.

WHITE PINE, (up to 12 in. wide)

1st, 2nd and 3rd clear, 1 1/4 to 2 in.	\$100.00 \$86.00
B and C select, 1 1/4 to 2 in.	75.00 70.00
D select, 1 1/4 to 2 in.	60.00

RED PINE.

Clear and select, 1 1/4 to 2 in.	\$ 60.00 \$50.00
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BRITISH COLUMBIA FIR.

No. 1 and 2, clear fir stepping, 1 1/4, 1 1/2 or 2 in. x 10 or 12, edge or flat grain.	\$75.00 \$65.00
No. 1 and 2 clear fir, 1, 1 1/4, 1 1/2 or 2 in., up to 12 in. wide and 13 to 16 in. wide.	55.00 60.00
No. 1 and 2, clear fir, 1, 1 1/4, 1 1/2 or 2 in., 17 to 20 in. wide.	70.00
No. 1 and 2 clear fir, 2 1/4 to 4 in., up to 12 in. and 13 to 15 in. wide.	60.00 65.00
No. 1 and 2 clear fir, 2 1/4 to 4 in., 17 to 20 in. wide.	70.00
No. 1 and 2 clear fir, 4 x 4 to 6 x 6, and 7 x 7 to 10 x 10.	60.00 65.00

CLEAR CEDAR.

5 in. to 12 in. x 1 in. and 1 1/4 and 2 in.	\$ 71.00 \$74.00
9 in. to 12 in. x 1 in. and 1 1/4 and 2 in.	75.00 78.00
13 in. to 18 in. x 1 in. and 1 1/4 x 2 in.	83.00 86.00
19 in. to 24 in. x 1 in. and 1 1/4 and 2 in.	93.00 96.00
Rough squares, 3 x 3 or 4 x 4, and 5 x 5 or 6 x 6.	76.00 79.00
Rough squares, 7 x 7 or 8 x 8, and 10 x 10.	88.00 96.00

CLEAR B. C. SPRUCE.

1 x 4 to 1 x 12 and 1 x 14 in. S1S.	\$ 64.00 \$70.00
1 x 15 to 20 in. and 1 1/4, 1 1/2 or 2 x 4 to 12 in. S1S.	77.00 67.00
1 1/4, 1 1/2, or 2 x 14 in. and 15 to 20 in. S1S.	72.00 80.00
2 1/2 to 4 x 4 to 12 in. and 4 x 14 in. S1S.	76.00 79.00
2 1/2 to 4 x 15 to 20 in. S1S.	82.00
Rough squares, select and better, 3 x 3 or 4 x 4, and 5 x 5 or 6 x 6.	63.00 66.00
Rough squares, select and better, 7 x 7 or 8 x 8 and 10 x 10 or 12 x 12.	66.00 73.00

HARDWOOD OAK

Plain cut, white and red, 1st and 2nd clear 1 in. and 1 1/2 and 1 3/4 in. rough.	\$100.00 \$102.00
2 in. and 2 1/2 and 3 in. rough.	104.00 120.00
4 in. and 1 1/4 and 1 1/2 x 11 in. and wider, rough.	130.00 122.00
No. 1, Dimension oak.	
6 x 6 to 10 x 10 and 12 x 12 and up.	104.00 110.00
Common red and white oak.	85.00
1 in., 2 in., 3 in. and 4 in. and larger.	
Quartered sawed white, 1st and 2nd clear 1 in., and 1 1/4 and 1 1/2 in. rough.	142.00 146.00
2 in. rough.	148.00
Quartered sawed red, 1st and 2nd clear 1 in. and 1 1/4 and 1 1/2 in. rough.	118.00 124.00
2 in. rough.	127.00

WHITEWOOD.

1st and 2nd clear, 1 in. and 1 1/4, 1 1/2 and 2 in., rough.	\$107.00 \$115.00
1st and 2nd clear, 2 1/2, 3 and 4 in., rough.	125.00
1st and 2nd clear, 1 in., rough basswood.	75.00

BIRCH.

1st and 2nd clear, 1 in. and 1 1/4 and 1 1/2 in., rough.	\$77.00 \$79.00
1st and 2nd clear, 2 in. and 3 in., rough.	81.00 93.00
1st and 2nd clear, squares, rough.	100.00

MOULDINGS.

3/4 x 1 1/4, crown and bed moulding, per 100 ft.	\$1.65
3/4 x 2, and 3/4 x 5/4, crown and bed moulding, per 100 ft.	\$2.20 5.00

NEWAL POSTS.

4 x 4 and 5 x 5 by 4 ft., pine.	\$1.00 \$1.40
5 x 5 and 6 x 6 by 6 ft., pine.	1.75 2.00
4 x 4 and 5 x 5 by 4 ft., birch.	1.40 1.75
5 x 5 and 6 x 6 by 6 ft., birch.	2.25 3.25

SASH AND FRAMES.

CELLAR SASH

8 x 10, and 10 x 12, 1 1/2, 2 lights.	\$.60 \$.70
10 x 12, and 10 x 14, 1 1/2, 3 lights.	.80 .90
10 x 12 and 12 x 14, single sash, 1 light.	.50 .55
2 ft. x 6 ft. 6 in. and 2 ft. 8 in. x 6 ft. 8 in., 2 x 5 1/2 in. jamb, door frames.	2.00
2 ft. 10 in. x 6 ft. 10 in. and 3 ft. x 7 ft., 2 x 7 1/2 in. jamb.	\$2.50

INSIDE DOOR FRAMES.

KNOCK DOWN.

2 ft. 6 in. x 6 ft. 6 in.; 2 ft. 8 in. x 6 ft. 8 in.; 2 ft. 10 in. x 6 ft. 10 in.; 3/4 x 5 1/2 in. jamb.	\$1.25
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VERANDAH MATERIAL.

BALLUSTERS.

1 1/4 x 1 1/4 fir, pine or cedar.	\$.12
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HAND RAIL.

2 x 4, and 3 x 4, pine, cedar or fir.	\$.75 \$.12
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VERANDAH POSTS (Turned)

5 x 5, 6 x 6, by 8 ft.	\$2.00 \$2.50
5 x 5, 6 x 6, by 9 ft.	2.50 2.75

PORCH COLUMNS (Staved, Pl. base and cap).

6 x 6, by 6 ft. and 8 x 8 by 9 ft.	\$2.75 \$5.50
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PRICES FURNISHED BY WINNIPEG PAINT & GLASS CO.

Corinthian Stone

Was used in this building as well as for
two others for the same proprietor. Why!

BECAUSE IT WAS THE BEST

The same reason applies to others.



Any
Size

Any
Shape

Any
Quantity

Send
us
your
Plans
for
Prices

Weber Chambers, King Street, Berlin,—Architect, Chas. E. Cowan, Esq., Berlin

ERECTED 1910 BY THE I. S. K. WEBER CO., LIMITED, BERLIN

All the Stone for above building supplied by

The Corinthian Stone Co.

OFFICE AND WORKS:

G. T. R. JUNCTION, GUELPH, ONTARIO

Corrected July 14, 1911	Advertised on Page	St. John	Montreal	Toronto	Winnipeg	Edmonton	Vancouver
CEMENT							
Bbl. lots in bags, refund on bags returned.....	147	\$ 2 00	\$ 1 45	\$ 1 90	\$ 2 00-2 35		\$ 2 45
Car lots F. O. B. Car.....	11	1 00	1 35-1 40	1 70	F.O.B. Ft. Wm.		
3000 Bbl. lots.....				1 55	1 55		
Small lots 10 cts. to 15 cts. extra for delivery on job							
BRICK							
Per M							
No. 1 Dry Red Pressed.....	iii	21 00	16 00	16 00-17 00	33 00		40 00
No. 2 Dry Red Pressed.....		20 00	25 00	14 00			
No. 1 Dry Buff Pressed.....		25 00	17 00	18 00	45 00		
No. 2 Dry Buff Pressed.....		24 00	16 00				
American Pressed.....			32 00-35 00				45 00
Red Stock, Inside.....			9 00	9 50			13 00
Red Stock, Facing.....			10 00	12 00	23 00		45 00
Grey or White Stock, Inside.....			8 00	9 50	11 00		
Grey or White Stock, Facing.....			17 00	11 00			55 00
Wire Cut for Foundations.....			10 00	11 00	45 00		
Porous Terra Cotta.....			14 00	30 00-35 00	45 00		
Scotch and English Fire.....		23 00	20 00	32 50-35 00			45 00
American Fire.....			20 00	28 00-31 00			
No. 1 Enamelled.....		90 00	73 00		100 00		100 00
LIME, PLASTER, ETC.							
Lime del. per 200 lbs.....		Per bbl. 85	6 00				1 35
Lime, Del. per cwt.....		Cask	0 40	0 38			
Lime, Del. per car lot, per ton, F.O.B. Cars.....	147	1 30-1 40	8 00	7 60			
Hydrated Lime, per ton, Del.....		bbl. haired 1 60	13 00	10 60	12 00		25 00
Hard Wall Plaster, Sanded, del. Ton, Bags Extra.....			4 75	5 85	12 50		6 00
Hard Wall Plaster, Unsanded Stucco.....			13 75	8 50			
Plaster of Paris, per Bbl. of 50 lbs.....			2 00	3 00	3 10		4 25
Sacket's Plaster Boards 10 sq. 32 in. x 36 in.....							3 50
Hair per pound.....			0 04	0 04			
BUILDING AND ROOFING SUPPLIES							
Tar Paper, 7-oz., 10-oz., 16-oz., per cwt.....	141	1 60	1 50	1 80			3 25
Tar Sheathing, per roll of 400 sq. ft.....		40	0 32	0 40	0 88		00
Dry Sheathing, No. 1 per roll of 400 sq. ft.....		50	45				75
Tar Fibre (or Dry No. 1), No. 2, per roll of 400 sq. ft.....		40	45	40	72		1 00
Dry Fiber No. 2, per roll of 400 sq. ft.....		28	26	30			
Ready Roofing, 2 ply, per roll of 100 sq. ft.....		62	57	2 50	2 00		2 50
Ready Roofing, 3 ply, per roll of 100 sq. ft.....		85	77	3 00	2 50		3 50
Roofing Tin Caps, per cwt.....		6 00	7 00	7 00	7 00		7 25
Roofing Wire Nails per cwt.....		6 75	5 00	6 00	4 15		4 50
Roofing Cement in Bbls. 40 gals.....		5 50	5 00				%
Roofing Cement small lots per gal.....		1 20	20				
Roofing Cement Bbls., per cwt.....				80	3 25		
Coal Tar, per Bbl., 40 gals, crude.....		3 85	3 15	3 50	5 00		7 25
Coal Tar, refined.....				4 00			
Roofing Pitch, No. 1, per 100 lbs.....		1 70	65	70	1 00		
Roofing Pitch, No. 2, per 100 lbs.....			50	60			
ROOFING SLATES							
No. 1 Canadian 10 x 16 in., per square, F.O.B. Cars.....			8 00	7 00			
Mottled Unfading 10 x 16 in., per square F.O.B. Cars.....			10 00-12 00	7 75			
Green Unfading 10 x 16 in., per square F.O.B. Cars.....			8 00-10 00	7 75			
Red Unfading 10 x 16 in. per square F.O.B. Cars.....			10 00-12 00	18 00			
SEWER PIPE							
Straight per ft.							
4 inch.....		08	07	08 3/4	10 1/2		12
6 inch.....		10	10	14	16 1/2		21
9 inch.....		25	21	22 3/4	29		70
Single Junction				35	50		20
4 inch.....		50		56	70		1 70
6 inch.....		72		91	1 20		
9 inch.....		1 45		56	50		
Increases and Reducers			54	91	1 00		
6 inch.....			84	70			
P. & H. H. Traps							
4 inch.....				1 12	1 63		
6 inch.....		1 10		2 27 1/2	3 25		
9 inch.....		1 80		26 1/4	35		50
Bends			23	42	50		1 00
4 inch.....		4 00	38	68 1/4	1 05		
6 inch.....		20	84				
9 inch.....		50					
Weeping Tile							
2 1/2 inch.....		1 05		02			04
3 inch.....				02 1/2			05
4 inch.....				03 1/2			
These prices are net, being 65% off list price. Car lots, 12% off							
STONE							
SELECTED RUBBLE—							
Per ton delivered.....			2 75	2 75			
RUBBLE							
Per ton delivered.....				15 00			
Per ton delivered.....				1 65			
Per ton delivered over hill.....				16 00			
Per ton delivered over hill.....				1 75			
Per ton on car.....				1 30			
HEADS AND SILLS							
Per foot Rock Face and Sawn Sills.....	1-145			38			
Per foot Rock Face 4 in Sawn Sills.....				35			
Per foot Rock Face Heads (Indiana).....				60			
Per foot Rock Face Heads (Breer and Credit Valley).....				50			
Per foot Sawn Heads Cement.—Material.....				30 & 31-40			
Per foot Bay Window Heads.....				30 & 31-45			
Per foot Bay Window Sills.....				30 & 31-40			
Per foot Tooled Heads and Sills.....				30 & 31-50			
Per foot Washed and Tooled Heads and Sills.....			65	30 & 31-60			
PIER CAPS							
Each 16 in x 16 in x 4 in Rock Face.....	1-145			1 25			
Each 20 in x 20 in x 4 in Rock Face.....				1 75			
Each 16 in x 16 in x 5 1/4 in Rock Face.....				1 50			
Each 20 in x 20 in x 5 1/4 in Rock Face.....				2 00			
RAY COURSING							
Per yard 3 in—6 in delivered in small lots.....				2 50			
Per yard 6 in—12 in delivered in small lots.....				2 75			
Crushed, per cu. yd., del. on job.....				2 25			
Crushed, F.O.B. Cars, per ton.....			\$ 90-1 00	\$ 1 30-1 35			2 75
Binder, F.O.B. Cars, per ton.....			1 50	1 30-1 35			
Brown Coursing, per yd., Del.....				3 25-3 50			
Terra Cotta (Constructional British) per ft. cu.....			1 50-2 00	1 20-2 20			

BUILDERS AND CONTRACTORS

REMEMBER When Figuring on New Work that

WATER-WASHED SAND

WILL GIVE YOU 50% STRONGER MORTAR AND CONCRETE
THAN A PIT SAND AND THE COST IS NO MORE, TRY IT!

Dealers in
CRUSHED GRANITE
CRUSHED STONE

SAND & SUPPLIES, LIMITED
TORONTO

Phones :
OFFICE, A 1947
YARD, A 1948



Make Your Buildings Rentable

By the Addition of Gas Ranges and Water Heaters

When a tenant steps into a home, apartment or flat, and there finds a gas range and water heater set up ready for use in the kitchen, it makes a very favorable impression on him. The little extra cost is more than offset by returns from a satisfied tenant. Gas water heaters especially are not things to be carried from one house to another: besides, conditions vary—one water heater may not just suit the newer conditions. It pays to have

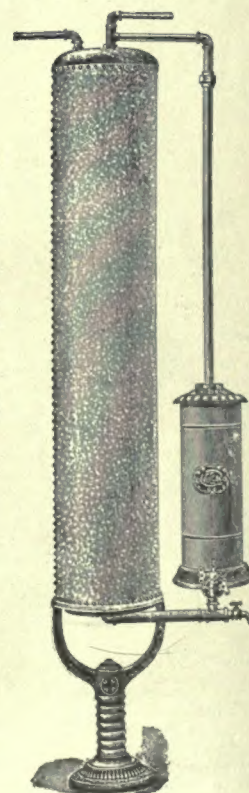
The Vulcan Gas Ranges and Water Heaters

installed. They keep a house or apartment in a much cleaner and healthier condition. Once installed there is then no danger of damaged walls and staircases through careless carrying in and out of tenants' own stoves. The VULCAN goods are also made strong. Parts can be replaced so easily. The Gas Company cleans the burners once every three months without extra charge (Toronto homes only). This promotes lasting satisfaction. Tenants remain because of the increased accommodation. Let us have a talk on the matter. We can supply interesting particulars. We are at your service. Remember also, that we inspect Toronto piping contracts for you, free of charge, to insure efficiency. Act to-day. Consultation free. Prices right. Terms easy.

THE CONSUMERS' GAS COMPANY OF TORONTO

12-14 ADELAIDE STREET W.

PHONE MAIN 1933



CORRECTED JUNE 14, 1911.

	Advertised on Page	St. John	Montreal	Toronto	Winnipeg	Edmonton	Vancouver
WAGE SCALE IN BUILDING TRADES—							
Stone Masons, per hour.....		\$ 45	\$ 50	\$ 52½	\$ 60-65		
Bricklayers, per hour.....		45	50	52½	60-65	65	
Structural Iron Setters.....			33½	on strike 25-35			
Ornamental Iron Setters.....			25-30	30-35	55		
Plasterers, per hour.....		Per day 3 00	40	50			
Lathers, Iron, per day.....		2 25	44-45	3 50			
Lathers, Wood, per day.....		2 25		3 00	50 sq yd		
Hoisting Engineers.....			25	35	40-60		
Tile Setters, per hour.....			25	40	60		
Plumbers, per hour.....		Day 3 00	30-35	42½	50	57	
Steamfitters, per hour.....		Day 3 00	30-35	42½	50	57	
Carpenters, per hour.....		Day 3 00	25-30	37	40	50	
Stone Cutters, per hour.....		Day 3 50-4 00	40	50	60		
Marble Cutters, per hour.....		Day 2 45	37½	35-40			
Marble Cutters, per hour.....		Day 2 50	30	30-35	35		
Painters, per hour.....		Day 2 50-3 00	22½-30	30-35	40	45	
Sheet Metal Workers, per hour.....		Day 2 50-2 75	30	33			
Electricians, per hour.....		Day 2 00-2 50	25-27½	30	40		
Roofers, per hour.....			25-30	30	40		
Cement Finishers, per hour.....			30-35	40	50		
Laborers and Hod Carriers, per hour.....		Day 2 00	15-22	25-28	25		
Teams, per day.....		Day 5 00-6 00		5 00	5 00-6 00		
Subject to change May 1st.							
HARDWARE							
Steel Channels per 100.....		3 25		2 75-3 00			
Expanded Metal, 10 gauge, per 100 feet.....		3 75		3 50			
LOCKS							
Inside Sets, Steel, Various Finishes.....		40-1 50	40-1 50	40-1 50			
Inside Sets, Solid Brass, Various Finishes.....		80-2 25	80-2 25	80-2 25			
Inside Sets, Pressed Glass, Various Finishes.....		1 85-2 20	1 85-2 20	1 85-2 20			
Inside Sets, Cut Glass, Various Finishes.....		2 00-3 00	2 00-3 00	2 00-3 00			
Front Door, Bit Key, Steel, (old style).....		1 00-1 50	1 00-1 50	1 00-1 50			
Front Door, Bit Key, Steel, (new style).....		2 60	2 60	2 60			
Front Door, Bit Key, Brass, (new style).....		3 75-5 00	3 75-5 00	3 75-5 00			
Sash Lifts, Steel, per doz.....		15-25	15-25	15-25			
Sash Lifts, Brass per doz.....		55	55	55			
Sash Fasteners, Steel, per doz.....		50-80	50-80	50-80			
Sash Fasteners, Brass, per doz.....		3 25-4 20	3 25-4 20	3 25-4 20			
Casement Fasteners, Solid Brass, with "T" Heads.....		Not carried	25-50	20-50			
Casement Fasteners, solid Brass, with "T" Heads and Pull Handles.....		Not carried	35-60	35-60			
Casement Fasteners, Iron, Black or Bronze.....		10-25	10-25	10-25			
Extension Bolts, Mortised, Each.....		80-1 20	80-1 20	80-1 20			
Casement Adjusters, Brass, Each.....		25-60	25-60	25-60			
Cupboard Turns, Steel, Each.....		07-15	07-15	07-15			
Cupboard Turns, Brass, Each.....		20-38	20-38	20-38			
Door Checks, Interior, Each.....		3 65	3 65	3 65			
Floor Hinges, Double Swing, Each.....		1 50-1 70	1 50-1 70	1 50-1 70			
WINDOW GLASS							
UNITED INCHES							
10 to 25 per 100 ft. Box.....		Star D.D. 2 55-3 45	Star D.D. \$2 81-3 74	Star D.D. \$2 68-3 94	Star D.D. \$.....		Star D.D. \$4 60-5 75
26 to 40 per 100 ft. Box.....		2 75-3 75		2 93-4 26	5 50		4 80-6 70
41 to 50 per 100 ft. Box.....		3 20-4 05	3 53-4 72	3 21 4 73	6 50		5 15-7 50
51 to 60 per 100 ft. Box.....		3 50-4 35	3 74-5 10	3 38-5 36	6 50		5 50-8 25
61 to 70 per 100 ft. Box.....		3 95-4 85	4 00-5 53	3 63-6 15	8 50		5 75-8 65
71 to 80 per 100 ft. Box.....		5 30	4 42-5 95	3 94-6 93	9 50		6 10-9 60
81 to 85 per 100 ft. Box.....		5 75	5 02-6 67	4 41-7 88	10 50		7 00-10 75
86 to 90 per 100 ft. Box.....		7 00	7 74	9 45	11 50		12 00
91 to 95 per 100 ft. Box.....		8 15	8 42	11 03	13 50		14 00
96 to 100 per 100 ft. Box.....		9 60	9 35	12 02	16 00		16 50
101 to 105 per 100 ft. Box.....				15 12	18 50		20 50
106 to 110 per 100 ft. Box.....				17 33	21 00		24 50
PUTTY							
Bulk, in casks, per cwt.....		2 25	1 85	\$ 3 00	\$ 2 00		\$ 3 60
Bladders, in bbls., per 100 lbs.....		2 65	2 00	2 25-2 50	3 15		5 00
Bladders, in 100 lb. Cases.....		2 75	2 25	2 75	3 40		
PAINTS, ETC.							
WHITE LEAD							
Pure F.B.W. English, per 100 lbs.....		6 75-8 01		\$ 7 25			
Pure Canadian, per 100 lbs.....		6 85	6 50	\$ 6 75			
No. 1, per 100 lbs.....		6 25	6 00	6 25			
VARNISHES							
In 5-gal lots., Per gal. net.,							
No. 1 Brown Japan.....		1 00	1 10	1 10			
Elastic Oak.....		1 50-2 00	1 50-2 00	1 50 2 00			
Hard Oil Finish.....		1 50-2 00	1 50-2 00	1 50 2 00			
Light Oil Finish.....		1 75-2 25	1 75-2 25	1 75-2 25			
Damar.....		1 75-2 00	1 75-2 00	1 75-2 00			
Shellac, white.....		2 75-3 00	2 75-3 00	2 75-3 00			
Shellac, Orange.....		2 50-2 90	2 50-2 90	2 50-2 90			
Turpentine, Brown Japan.....		1 25-1 50	1 25-1 50	1 25-1 50			
Turpentine, Black Japan.....		1 10-1 20	1 10-1 20	1 10-1 20			
Turpentine, No. 1, Black Japan.....		85-90	85-90	85-90			
Pure Knotting Shellac.....		3 00	3 00	3 00			
GLUE							
Common.....		10	08-08½	08-08½			
French Metal.....		16	10-14	10-14			
White, Extra.....		25	18-22	18-22			
Gelatine.....		Not sold	23-30	23-30			
SAND							
Water washed, on dock, per cu. yd.....	147			50			
Water washed, delivered, per cu. yd.....				90			

As incorrect markets are worse than none, we would appreciate notice of any errors in our columns

Catalogue Individuality

The strength of your catalogue lies in its individuality. It's the "something different" that sets it apart from others.

Can a merchant pick your catalogue from amongst a number of others knowing it is yours, without stopping to look for the name? If he can it is up to your goods—the catalogue is doing its part.

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Acton Publishing Company, Limited

59-61 John Street - - TORONTO

Montreal Offices: Coristine Bldg., MONTREAL

WHEN YOU DESIGN COUNTRY HOUSES

REMEMBER THAT



IS THE SAFEST ILLUMINATING GAS EVER INVENTED

Copies of Laboratory Tests on Application.

THAT BLAU-GAS IS CHEAPER PER CANDLE POWER
THAN ANY OTHER ISOLATED LIGHTING SYSTEM

REMEMBER THAT :

There is no care, no trouble or worry.

It takes 15 minutes a month to change empty bottles
for full ones.

There is nothing else to do.

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